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AMERICAN PATENTS.

List of American Patents which issued in the month of September, 1847, with Exemplifications, by CHARLES M. KELLER, *late Chief Examiner of Patents in the U. S. Patent Office.*

1. For an *Improvement in Scrubbing Brushes;* C. J. Abels and R. M. Bicknell, Philadelphia, Pennsylvania, September 4.

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the manner of manufacturing the fibres of the piassaba into brushes: viz., softening the same until they can be bent double without breaking, folding the bunches thereof at their centres, and inserting and securing the same, while in a wet or moist state, in the respective holes in the brush stock, by means of a cord, manufactured and prepared substantially in the manner, and for the purpose herein set forth. We also claim the method of manufacturing and preparing the cord, substantially as herein described, for the purpose of enabling us to work the bunches of piassaba in a wet or moist state, as herein set forth."

2. For an *Improvement in the Construction of Vessels;* John H. Fellows, Cincinnati, Hamilton county, Ohio, September 4.

The patentee says,—"The nature of my invention consists in the use of stout longitudinal planking, united by iron rods passing through the planking edgewise, starting from the keel, through the bottom and side planking, and also through the deck beams; and then secured by

nuts, to be screwed down so as to bring the deck beams and planking firmly together."

Claim.—"What I claim as new, and desire to secure by letters patent, is the application of rods of iron, passing through the longitudinal planking, and screwing them together, thereby dispensing with the timbered frame, as is required in the present mode of constructing hulls of vessels."

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3. For an *Improvement in the Manufacture of Soap;* John Shugert, Elizabeth, Allegheny county, Pennsylvania, September 4.

The patentee says,—"Take two pounds of sal soda, and two pounds of raw turpentine, half a pound of slacked lime, previously steeped about twenty-four hours in water, to remove its caustic or burning properties. To the above I add one pound of brown sugar. This composition I put into a vessel, with about two gallons of water, and boil it about half an hour, when it will have become a good soap for cleansing articles, and forms an excellent basis for the saponaceous compound;—to which I add about ten pounds of common soap, and boil the whole compound about two hours, or until it will produce the required bars of soap. I then pour the compound into suitable coolers, and when cooled, I cut it into the required bars for use, when it will be found to be the best soap for cleansing articles, ever known or manufactured."

Claim.—"What I claim as my discovery, and desire to secure by letters patent, is the before described composition, producing a saponaceous compound for cleansing clothes and other articles."

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4. For an *Improvement in the Construction of Lime Kilns;* Jacob H. Bower, Walnut, Juniata county, Pennsylvania, September 4.

Claim.—"Having thus fully described my invention, I do not claim the peculiar manner of laying the stones, in order to form conducting passages, or channels, for the diffusion of the heat, as I am well aware such disposition or arrangement has been made, in the setting of brick kilns; but what I do claim as my invention, and desire to secure by letters patent, is combining such arrangement, or disposition of the lime stone, with a temporary casing, or kiln, in the manner above specified, by means of which I obviate the difficulty and expense incurred in the erection of a permanent kiln."

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5. For an *Improvement in Preparing India Rubber, for the Manufacture of Water Proof and Elastic Goods;* James Thomas, City of New York, September 4.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the use of the acids of sulphur, of a lower degree of oxygenation than the sulphuric acid, in combination with suitable basis; but prefer a hyposulphite which can be used alone, or in combination with the other salts of the acids of sulphur, as described, or

with the sulphurets. I claim the use of artificial sulphuret of lead, used either alone with the india rubber, or mixed with a salt of lower degree of oxygenation than a sulphate, but prefer using a mixture of about equal parts of a hyposulphite and artificial sulphuret of lead, as before stated."

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6. For an *Improvement in Feed Rollers for Carding Machines, &c.;* H. G. Ellsworth, Enfield, Hartford county, Connecticut, September 4.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the fluting with the screw thread, or groove, on the surfaces of feed rollers, thereby forming teeth, which straightens the fibres, and more effectually prevents lapping."

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7. For an *Improvement in Baby Jumpers;* G. W. Tuttle, City of New York, September 4.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combining of a spring, or springs, with a suspended apparatus, for exercising children and invalids; it being understood that my claim is limited to the combination of such spring, or springs, and suspensory apparatus, as will enable the child to bring its feet conveniently in contact with the floor, while its body is suspended, substantially in the manner described; not intending, however, by the foregoing description and claim, to limit myself to the exact form, or mode of uniting any of the parts, of the apparatus, but to vary the same as I may think proper, whilst I attain the same end by means substantially the same."

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8. For an *Improvement in Preparing Wool and Cotton for Carding;* George L. Mason, Williston, Chittenden county, Vermont, September 4.

The patentee says,—"The nature of my invention consists in providing a steam box, underneath the apron that conveys the material to be carded to the carding machine, which box, in shape, is adapted to the apron, and is provided with valves upon its upper side, for the escape of steam at the pleasure of the operator."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the application of heat and moisture, by means of steam, to cotton, wool, and other material, preparatory to carding and manufacturing."

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9. For an *Improvement in Making Mattrasses;* Charles L. Fleischman, City of Washington, D. C., September 4.

The nature of this invention consists in preventing horse hair, sheep's wool, moss, hair, tow, feathers, corn husks, and all such materials, except cotton, which have hitherto been used for making mattrasses, cushions, and all kinds of upholstering work, from matting, by the in-

terposition of layers of glazed cotton, or cotton batting, confined between paper, cloth, or other like materials, and thus combining materials of a strong, with others of a more delicate, texture.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is, first, placing between layers of horse hair, moss, or any of the specified materials, layers of cotton batting, either confined between cloth, paper, or any suitable fabric, or cotton batting glazed on both sides, or simply calendered, as above described.

"2d. I claim the mode of making mattrasses, suitable for winter and summer use, substantially as herein set forth."

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10. For an *Improvement in Manufacturing Sugar;* Antoine Marie Felix Chevet, St. James' Parish, Louisiana, September 4.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the employment of soluble saccharate of lime, instead of lime in its native state, and the employment of an agent which may take off the lime after its action, without leaving anything soluble in the saccharine liquor."

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11. For an *Improvement in Stove Grates;* Geo. A. Phillips, City of New York, September 4.

Claim.—"I do not claim to have invented any of the parts herein described, by which the construction of the shaking bar, and the combination thereof with the levers, gives a lateral and horizontal movement at the same time, with a slight vertical rock to the grates, to shake down the ashes; nor do I know of any arrangement similar to that by which the slide bar and levers will both let down the grate, to empty the fuel or cinders, and afterwards replace the grates for use, without opening the stove, or furnace. Therefore I claim as new, and of my own invention, the application, constructive arrangement, and combination of these parts, for these purposes, substantially in the manner described."

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12. For an *Improvement in Type Casting;* George Bruce & Co., assignees of William P. Barr, City of New York, September 4.

Claim.—"I claim as my invention, and desire to secure by letters patent, the lever, working in a slot in the arm of a machine for casting printing types, on a pin passing through the arm, and across the slot in the plane of the face of the matrix, or below it; the forked or double acting slide, by which the lever is controlled and worked; the attachment of the spring to the lever, so that it shall be moved entire with the matrix, and diminish in pressure at the moment of discharging from the type, or the attachment of the spring to the matrix holder, for the same purpose; the matrix holder, with its tightening and regulating screws, and also the matrix holder with one arm, and a fixed shoe, in which the matrix may be confined, or allowed to move, and the holder may be allowed to move, or be confined; and the arrangement and combination of these parts as here described, or varied to

suit another machine, or hand-mould, for casting printing type, so as to move the matrix to and from the mould, and to discharge it from the type nearly perpendicularly, or at any suitable angle without using the edge of the mould for a fulcrum."

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13. For an *Improvement in Sash Fasteners;* Morton Judd, New Britain, Hartford county, Connecticut, September 4.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the method of fastening window sash, by placing the catch in the centre, longitudinally, of a box—said box having three of its sides and ends closed, the ends having a jog, or shoulder, upon which a bar, or curved spring, is arranged, against which the end of the turning catch is placed, which serves to keep the spring in its place, and the spring to secure the catch in the position which it is made to assume, without bolts or screws; the catch, being thus placed in the centre of the box, answers the double purpose of securing the spring to its place, without the expense of fastening it in the usual way, together with the convenience of fastening or unfastening the window, by turning the catch either to the right or left. Fasteners constructed in this way, can be made of steel metal, whereby they can be afforded at one-quarter less expense than the ordinary way of casting, and are much stronger, not being mortised for the binding screws that confine the spring to the box, and the spring being placed loosely in the box."

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14. For an *Improvement in Machinery for Spinning;* M. W. Obenchain, Springfield, Stark county, Ohio, September 11.

The nature of this invention consists, first, in giving to the first pair of draw rollers, that receive the rovings from the condenser, an intermittent rotary motion, when this is combined with the second and third pairs, made with their peripheries in segments, with the segments of one set placed at right angles to the segments of the other; so that, when the second set are drawing the rolls, or rovings, between them and the first pair that have an intermittent motion, the thread shall receive twist from the spindles to the second set, and when these have performed a portion of a revolution equal to one segment, and liberate the rolls or rovings, the other pair begin to draw, the twist given to the thread, from the points of the spindle to the second pair, is permitted to run up to the rollers that move with an intermittent motion, that the rovings may be partially twisted, the better to sustain the drawing operation.

The second part of this invention consists in giving a reciprocating motion to the guides, around which the rolls or rovings pass, between the condenser and the first pair of draw rollers that have an intermittent motion, for the purpose of taking up the slack made by the continuous delivery of the condenser, during the time that these rollers are not in motion.

The third part of this invention consists in giving to the guides, around which the rovings pass, an intermittent rotary motion on their

axis, corresponding with the intermittent motion of the first pair of draw rollers, to prevent the breaking of the rovings by friction, in passing around the guides.

And the last part of this invention relates to the mode of regulating the amount of twist to be given to the threads, by varying the ratch of the two pairs of segment draw rollers: that is to say, by varying the distance between these two sets of rollers, which, at the same time, varies the distance between the lower pair of rollers and the points of the spindles; this being effected by mounting the lower pair of draw rollers on slides, so that, by means of a rack and pinion, they can be moved up or down, the cog gearing which communicates motion from one of the pairs of segment rollers to the other, being connected by joint links, so as to retain the cog wheels at their true pitch, as the distance between the draw rollers is varied.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is, first, giving to the first set of draw rollers an intermittent motion, in combination with the second and third sets of draw rollers, made with segments to draw alternately, substantially as described. 2d. I claim giving to the series of guide rollers an intermittent reciprocating motion, to take up the slack of the roving, and then to give it out, substantially as described, in combination with the intermittent motion of the first set of draw rollers, as described. And I also claim, in combination with this, giving to the guide rollers an intermittent rotary motion, to prevent the breaking of the rovings by friction, as described. And finally, I claim hanging the third set of draw rollers in a sliding frame, substantially as described, provided with the requisite mechanical agent for moving it during the operation of spinning, whether this be rack and pinion, or other mechanical equivalent, whereby the amount of twist to be given to the threads that are being drawn and spun between the rollers, can be regulated at pleasure by the attendant, as described."

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15. For an *Improvement in Carriages, &c.;* Chas. J. Woolson, Cleveland, Ohio, September 11.

The nature of this invention consists in placing the beam of the carriage body, and its contents, upon the axle, very near the wheels, in a simple and improved manner.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is connecting the "cradle spring," so called, or the single steel spring, similar in form to the half of an elliptic, to the forward axle of four-wheeled carriages, or wagons, at points near the hub, so as to have the spring form the rocker, and turn with the axle, and transfer the weight from the middle to the ends of the axles, as described, when this is combined with the body of the carriage, by means of the fifth wheel attached to the spring, as described."

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16. For an *Improvement in Burring Machines;* Ziba Parkhurst, City of New York, September 11.

Claim.—"What I claim as my invention, and desire to secure by let-

ters patent, is, 1st, the combination of the receiver, stripper, middle clearer, middle stripper, top stripper, hoppers, and shell, whether arranged in the manner described, or in any other mode which is substantially the same, by which results analogous to those described are produced.

"2d, I claim the zig-zag angular strippers as set forth, and generally, whether used in combination with a cylinder constructed like this cylinder, or a cylinder constructed in any other form.

"3d, I claim the combination of the shell with the receiving cylinder, for pressing the wool against the cylinder, and protecting it from the dirt thrown off by the strippers, whether made in the manner described, or in any other mode or manner which is substantially the same."

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17. For an *Improvement in Lithographic Presses;* John Donlevy, City of New York, September 11.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is, 1st, The placing a half box of metal, to act as a bearing to the axle of the cylindrical roller upon the bed frame, either to it, or detached from it, and the placing the same upon the platform to receive a machine without the bed frame, without any opening, cavity, or groove, in the bed frame or platform, to receive it.

"2d, I claim the forming of the arch, in the manner and variety of form described, with cavities to receive the axle of the cylindrical roller, and the half box on which the same is situated, or with cavities, or openings, to receive detached boxes for the axles, or the axles without boxes, either cast in the feet, or other part of the columns, and also to receive the screw and eccentric when used. But I do not claim as my invention, the form of the cavities, or projections, on the crown of the arch intended for the lever box, screw, and spiral spring, nor the use of ways attached to the inner side of the columns."

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18. For an *Improvement in Steering Apparatus for Steering Vessels;* Isaac L. Blanchard, Weymouth, Norfolk county, Massachusetts, September 11.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of chains, two windlass barrels, cogged wheels, and purchase wheels and shaft, as applied to the rudder head, in manner and for the purpose specified. I further claim the combination of the index pointer, or apparatus, with the rudder head, for the purpose of denoting the direction of the rudder, when the tiller is removed, all as specified."

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19. For an *Improvement in Catches for Clasps;* James Bingham, Philadelphia, Pennsylvania, September 11.

The patentee says,—"The nature of my invention consists in constructing the catch, or coupling joint, in the form of a hinge, the pin, or wire, by which the male and female portions of the hinge are con-

nected, being firmly fastened to the male portion of the hinge, the female side being furnished with a slot in the upper part of the connecting portions of the joint, through which the male part of the joint can slide laterally, when thrown back over the female side of the catch, carrying the pin with it."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is fastening the pin, or wire, of the hinge catch, or coupling joint, firmly to the male side of the hinge, in combination with the longitudinal slot through the female portion of the joint, in the manner described."

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20. For an *Improvement in Fountain Pens;* Moses F. Hoit, Livingston, Sumpter county, Alabama, September 11.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the pen with the fountain, in such a manner that the tapering part, or the nibs, of the pen may serve as a valve, or valves, to the orifice, or orifices, which, being opened by the downward pressure in writing, allow the ink to flow, while, at the same time, the ink is prevented by the depression, from being drawn up between the pen and the tube as described."

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21. For an *Improvement in the Construction of Chimneys;* John B. Kelsey, Newburyport, Massachusetts, September 11.

Claim.—"What I claim is, first, the combination of the air chamber, in rear of the back, and sides of the fire place, or any part thereof, with the inlet air pipes, or passages, and outlet pipe leading into the room, the said pipes having dampers, or valves, in the manner described; and for the purpose of distributing the heated air, and using part of it for the chimney, and part for heating the room. I claim the combination of the two separate chambers, and their respective inlet and discharge pipes, valves, &c., as arranged and made to operate substantially as described."

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22. For an *Improvement in Compositions for Lubricating Machinery;* P. Zieber, John Hancock, and Patrick S. Devlin, Reading, Berks county, Pennsylvania, September 11.

The patentees say,—"The nature of our invention consists of the following ingredients:—To thirty gallons of water, add ten pounds of carbonate of soda, two pounds of gum tragacanth dissolved."

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the combination or admixture of the water, sal soda, and gum tragacanth, the ingredients herein named, for the purpose herein named."

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23. For an *Improvement in Smut Machines;* Jacob Brenner, Liberty, Tioga county, Pennsylvania, September 11.

The patentee says,—"The nature of my invention consists in di-

viding the case into several compartments, one above the other, by means of horizontal rings, that extend from the inner periphery of the case, to a wire gauze, or perforated cylinder, surrounding and attached to the shaft, the beaters being attached to, and projecting from, this perforated cylinder, and made to rotate within the compartments between the horizontal rings,—when this is combined with a system, or set, of feeding or discharging tubes, connected with the outer case, the first to discharge the grain in the upper or first compartment, which is there acted upon by the first set of beaters, carried entirely around, and discharged by centrifugal force into the second tube, through an aperture the whole height of the compartment; this discharges the grain into the second compartment, in the same manner as it was fed into the first, and after being acted upon in this second compartment, by the second set of beaters, and carried around, it is discharged into the third tube, which delivers it to the third compartment, and so on to the end, where it is discharged from the lower end of the last tube, in a trough, or spout, leading from a fan blower, on the lower end of the shaft of the beaters. In this way, the grain undergoes a succession of beating operations, in passing from one chamber, or compartment, to another in succession, the beating operation in each being guarded by the outward current of air that enters the wire gauze, or perforated cylinder, at each end, and which is forced out by centrifugal force, through the apertures of the casing, carrying out with it the impurities that have been beaten out, and finally, the remaining dust, smut, &c., is discharged, and carried off by the current of air from the fan blower, which crosses the grain as it falls."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is making the outer case of the machine in several compartments, one above the other, with the sets of beaters playing within them substantially as described, in combination with the tubes, or spouts, attached to the periphery of, and opening into, the outer casing, to conduct the grain from one compartment to another in succession, substantially as described. And I also claim, in combination with a casing so constructed as above claimed, the beaters attached to the periphery of a perforated or wire gauze cylinder, open at both ends, that the rotation of the beaters may induce a current, or currents, of air, outwards, to discharge the dust and other impurities, through the apertures between the bars of the outer case, and to aid in delivering the grain to the conducting tubes, substantially as described."

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24. For an *Improvement in Machines for Hoeing Land;* Moses Stafford, Georgetown, Essex county, Massachusetts, September 11.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of one or more of the cross pieces, and their rods or other equivalents, with the rotary hoes, the same being used in manner and for the purpose described."

25 For an *Improvement in Horse Rakes;* John M. Stafford, Pike, Wyoming county, New York, September 11.

The patentee says,—"The nature of my invention consists in dispensing entirely with the stop bars, as used in L. M. Whitman's rake, and providing an apparatus which shall not interfere with the free operation of the rake, and accomplish the same purposes by a new mode."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the shafts, or keepers, with the segments of the horse hay-rake, as above described; not intending, however, by this claim, to confine myself to the use of two shafts or keepers, but to make use of two or one, as I may think proper, while I attain the same ends by substantially the same means."

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26. For an *Improvement in Preparing Materials for Lemonade;* James Warren, Jr., City of New York, September 11.

The patentee says,—"For lemon sugar, lemonade sugar, or sugar of lemon,—

Take of powdered loaf sugar, refined, 100 lbs.

"	"	citric acid, as prepared above,	3 lbs.	14 oz.
"	"	rind or peel,	"	6½ oz.
"	"	pulp or mucilage,	"	6½ oz.

and let them be thoroughly mixed together, when it will be fit for use. One large table spoonfull of the sugar thus prepared, will be sufficient for a tumbler of water, which will contain acid, and all the other parts of the lemon, equal to the half of a medium sized lemon."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the above described composition, for making lemonade, the whole being prepared substantially as described."

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27. For an *Improvement in Machinery for Manufacturing Hinges;* G. H. Horton and L. Armstrong, Hartford, Connecticut, September 11.

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the combination of the die, two impelling slides and chambers, and the turning die, the whole being arranged and made to operate together substantially as described. We also claim the wire feeding apparatus, in its combination with the dies, or machinery, for making the hinge joint, and as arranged, and operating therewith, substantially as hereinbefore specified. We also claim the slide, or hinge-discharging apparatus, as combined with the dies, or apparatus for making the joint of the hinge, and operating therewith, as specified; and, in combination with the said dies, or apparatus for bending the parts of the joint of the hinge, we claim the slides, (by which lateral extension of the metal is prevented,) the same being made to operate therewith substantially as specified. We also claim the combination of the cutting slide, or part which severs the wire, with the bending apparatus, the same being actuated and arranged as described."

28. For an *Improvement in Coloring Plates for Artificial Teeth;* Morris Levett and Henry Davis, City of New York, September 18.

The patentees say,—"The nature of our invention consists, first, in providing a coating of japan, or other substances, to represent the color of the gum or skin of the mouth, and with this we cover the exposed surfaces and parts of the setting of gold, or other material, for fastening the artificial teeth, and holding them in place; by which the exposed parts are made to correspond in color to the skin of the mouth and gums, and thereby prevent the exposure of the settings, and fastenings, when the mouth is open. Secondly, in the preparing a varnish, or other material, and applying the same to the settings of artificial teeth, so as to cause them to represent the color of the mouth or gum."

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the japanning, or otherwise covering, the setting or foundations of artificial teeth, in such manner as to disguise the setting, so as to represent the gum, or natural skin of the mouth, as nearly as possible, whether the same be effected in manner described, or by equivalents substantially the same. We also claim the herein described japan, or varnish, and the method of compounding and applying the same to the setting of artificial teeth."

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29. For an *Improvement in Hydrostatic Gas Stops, for Gas Pipes;* Joseph Battin, Philadelphia, Pennsylvania, September 18.

Claim.—"What I claim as new, and desire to secure by letters patent, is the manner in which I have arranged and combined the respective parts thereof, so as to effect the purpose herein made known: that is to say, I claim, in combination, the use of a tank furnished with a partition, which shall operate as a water trap, or seal, and with a tube for supplying and drawing off the water, the gas being admitted into the upper part of the tank, and the whole arrangement and operation being substantially the same with that herein described. And I do hereby declare, that I do not claim either of the parts of which my said seal, or trap, is composed, as in itself new; but I limit my claim, as above set forth, to the particular arrangement of said parts, so as to adapt it to the performance of the office for which it was designed."

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30. For an *Improvement in Cooking Stoves;* James McGregor, Jr., Saratoga, New York, September 18.

The nature of this invention consists in constructing the lower flue of a cooking stove, which passes under the oven, of greater depth than usual, and making the division plate, between the oven and fire place, which may be called the check plate, or any other plate, at, or near, that end of the flue which leads into the rising flue, or exit pipe, so that it shall extend down below the bottom, to form a reservoir of hot air, extending from the bottom plate of the oven, down to the lower edge of the check plate, at the end of the bottom flue, the draught being all below the edge of this plate, so that the gaseous products of com-

bustion, air, &c., which enter the deep flue under the oven, will rise by rarefaction, and occupy the space between the bottom of the oven and the lower edge of this plate, and thus guard and protect the oven from being suddenly affected by changes in the fire chamber and flues. The invention also consists in making the draught aperture of such a flue, larger in the parts that are furthest from the exit pipe, and gradually reduced towards the pipe, for the purpose of equalizing the heat under the oven, for as the tendency of all currents is to rush in straight lines, from one point to another, it follows that, unless some impediment be interposed, the heat will be concentrated under that part of the opening which is nearest the exit pipe; but by gradually reducing the size of the aperture through which the draught passes, as it approaches the exit pipe, this tendency is checked, and the heated air, smoke, &c., is forced to pass mainly through the enlarged part, and thus to equalize the temperature under the oven.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is making a reservoir in the upper part of the horizontal flue, under the oven, by means of the check plate, at, or near, the end of the flue, substantially as described. And I also claim making the draught aperture, in the check plate of such a flue, smaller near the exit pipe, or flue, and gradually larger as it recedes therefrom, substantially as described, whereby the smoke, and other products of combustion, are caused to circulate and pass under the entire bottom of the oven as described."

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31. For an *Improvement in Bridges;* S. F. Gassaway, Marietta, Cobb county, Georgia, September 18.

The patentee says,—"The nature of my invention and improvement consists in combining a number of parallel wrought iron suspension chains, and horizontal iron chords, with light timber frames arranged between them; such chains and chords being secured to horizontal parallel transverse iron bars, resting upon stone abutments and piers, for supporting the usual parallel strings, cross-ties, and iron rails, of a railway, forming, at once, a light, strong, durable, and cheap structure, adopted to plans when bridges of great span, strength, and economy, are required."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is uniting the successive spans of the bridge to each other, and causing them to co-operate, by the combination of the rods with the cross timbers, and the bolsters, or transverse plates, resting on the piers as herein set forth."

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32. For an *Improvement in Grinding Mills;* Joseph Pierce, Buffalo, New York, September 18.

The patentee says,—"The nature of my invention consists in providing a shaft, or shafts, having upon them one or more eccentrics, and one or more pulleys composed of metal, wood, other materials, or combinations of them, placed under the stone bridge trees, or bridge trees of all the spindles that are attached to the same motive power in the

mill, or upon levers upon which the traversing pins are placed, which traverse through the bridge tree, upon which the lower end, point, step, or foot, of the stone spindles stand, whether the stones are placed in line, or on a square frame or hearse."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the application, by machinery, of eccentrics upon shafts, to the bridge trees of the spindles, or the levers of traversing pins, upon which the point, step, or foot, of stone spindles stand, and of straps, connecting the pullies upon the shafts to the shoes of the mill hopper, so that, by rotating the shafts by levers, wheels, or pulleys, the eccentrics elevate and let down the bridge trees and shoes simultaneously and conveniently, upon starting and stopping the mills."

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33. For an *Improvement in Printing Oil Cloth Carpeting;* James Albro, Jr., Elizabethtown, Essex county, New Jersey, September 18.

The patentee says,—"My improvement consists, first, in the mode of printing oil cloth, in spreading or extending all the colors, after being put on by print blocks in the ordinary way, so as to cover the ground, or face of the cloth, thereby preventing the colors of the cloth on which the printing is made, from showing through the spaces between the peg-work. Second, In common with the above, I have still further improved the method of printing oil cloth, by blending the various colors, by rendering the surface more smooth and level, and giving it the appearance of velvet carpeting."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is, first, the laying on to the printed oil cloth, as finished in the ordinary way, a block having pegs extending over its entire surface, with its pitches, or guide pins, so arranged that its pegs shall fall on the interstitial spaces left by the pegs of the other blocks, for producing contiguity of all the colors, without supplying additional colors. And second, by applying, in addition to the above, a block, cut into small continuous lines, which blends and softens the colors, and improves the effect—either of these blocks can be used separately or jointly. I hereby declare, that I do not claim to have invented what is known to oil cloth printers, as *raised work*, by which two blocks are used for one color; the pegs of the second block falling upon the interstitial spaces of the pegs of the first block, both being dipped in the same color.

"I claim the above mentioned improvements, whether they are effected in the manner set forth, or in any mode substantially the same, producing a like effect by analogous means."

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34. For an *Improvement in Gas Regulators;* Joseph Battin, Philadelphia, Pennsylvania, September 18.

Claim.—"What I claim as new, and desire to secure by letters patent, is the manner set forth, of combining the conical governor, or regulator, and the quicksilver seal, with the gasometer, so as entirely to cut off, or to govern and regulate, the pressure of the gas within the distributing pipes. I do not make claim to either of these devices,

when taken separately, and uncombined with the gasometer and inlet pipe, but I limit my claim exclusively to the aforesaid combination, for the purpose herein fully set forth."

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35 For an *Improvement in Machinery for Planing Metals;* Alfred C. Jones, New Orleans, Louisiana, September 18.

Claim.—"What I claim as new, and desire to secure by letters patent, is the particular manner in which the slides, and the apparatus for moving them, are arranged and combined with each other, and with the bar, by which arrangement and combination said instrument is rendered portable, and capable of being attached to a work bench, or to the work on which it is to operate. I do not make claim to either of the individual parts, when taken alone, as of my invention,—slides, such as I have described, and the giving motion to them by means of screws, or of racks and pinions, being well known devices; I therefore, as above stated, limit my claim to the particular combination herein set forth, by which I have produced a tool which is substantially new, and of great utility."

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36. For an *Improvement in Moulding and Pressing Glass;* New England Glass Company, assignees of J. Magoun, East Cambridge, Middlesex county, Massachusetts, September 25.

Claim.—"What I claim, is the manner of making the foot of a glass goblet, or other article of like character, whereby I am enabled to manufacture it without the usual mould marks, or impressions of the mould, viz., by casting the said foot in the mould in the shape of a hollow cylinder, or inverted cup or bell-shaped, as described, or any shape approximating thereto, and in combination with, afterwards opening the same, or making it into a circular disk, by means as above specified. I also claim the hereinbefore described mode of making the mould, in order that the body part of it may be made in one piece, and without any side joint, or joints, by which any mark or impression of such joint, or joints, will be produced on the body of the glass article, in casting it in the mould; the said mode of making the said mould, being to construct the opening of the said bottom of the bottom, of a size sufficient to admit the shank and foot part of the glass article to be drawn upwards through it, as explained. I also claim the combination of the two series of cams, with the bottom plate, cam plate of the mould, and core of the foot, the same being for the purpose of elevating the glass casting from the core, or depressing the core from the said casting, in the manner set forth."

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37. For an *Improvement in Moulds for Pressing Glass;* New England Glass Company, assignees of J. Magoun, East Cambridge, Middlesex county, Massachusetts, September 25.

The patentee says,—"I make the mould in two or more parts, but with the upper part of it, or all that part of it above the flutes, like a

cylindrical ring, without any vertical seam. This ring I make to rest on the top of that part of the mould which constitutes the matrix of the fluted part of the glass article, the seam or joint of the two parts being made to correspond with the curve of the top of the flutes;—the piston or plunger of the mould passes down through the circular mouth, or opening. From the above, it will be seen that the interior of the ring is a hollow cylinder, without any vertical joint or opening, which can produce any impression, or injurious mould mark, on the outer surface of the cylindrical part of the fountain of the lamp, or whatever glass article of the kind may be cast."

Claim.—"What I claim is the ring, as combined with, and applied to, the body or fluted part of the mould, in manner and for the purpuse set forth."

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38. For an *Improvement in Preparing and Hardening Raw Hides;* Timothy Earle, assignee of H. Halvorson, Leicester, Massachusetts, September 25.

Claim.—"What I claim as my invention and discovery, is the process of treating the skin or hide of animals, or of thickening and converting it into a substance resembling horn, the same consisting of steeping or boiling it in an alkaline solution, an astringent solution, or an alkaline and astringent solution, and afterwards submitting it to the action of hot or boiling oil, as specified. And furthermore, as it may often not be desirable to full up, or thicken, the hide or skin, but simply to render it hard and semi-transparent, I claim to accomplish the same, by steeping or boiling it in an alkaline solution, and afterwards in a hot or boiling drying oil, as described."

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39. For an *Improvement in Window Blind Fasteners;* John L. Bassett, Bridgeport, Fairfield county, Connecticut, September 25.

The patentee says,—"The nature of my invention consists in providing a latch for a blind or shutter, or door fastening, with certain parts which connect it to the door plate. One of said parts is a set off on the edge or side of the latch, which I call a shoulder; this sets on the plate. Another one of these parts is a projecting branch, setting out some distance on the other edge of the latch, and rests on the plate. Another of said parts is a narrow strip, or prong, which is attached to the branch last mentioned;—this prong extends in a direction about parallel with the main latch, and is of a sufficient length to receive and guide the spiral spring, which is put around it, after that the latch is put through the mortise in the plate. When the spiral spring is around the prong, one end of it sets up against the plate, being secured there by fastenings, the other end to the edge of the latch. Another one of said parts for connecting the latch to the plate, is at the point ranging with the edge of the plate, which I call a notch; the centre of the notch sets against the edge of the plate, the under part of the shoulder first mentioned makes one side of said notch, and the other side of the notch is made by a jut."

Claim.—"What I claim as my improvement, and desire to secure by letters patent, is connecting the latch to the plate, by the notch and projecting branch, in combination with the prong and spring."

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40. For an *Improvement in Machinery for Turning Wooden Bowls;* Parley Hutchins, Jr., Washington, Hampshire county, Massachusetts, September 25.

The patentee says,—"The nature of my invention consists in turning bowls or dishes, from blocks of wood, or any other suitable material, by means of one or more knife, or knives, shaped in a curved form, and placed in a frame made for holding them, which frame being made fast to the middle of a semi-circular arm—said arm having cogs or teeth, which are operated upon by an endless screw, for the purpose of moving the said semi-circular arm and knife frame, up to the revolving block of wood, for the purpose of turning off bowls or dishes, as set forth."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the semi-circular arm with the knife frame, holding one or more knives, and adjustable piece, for holding the gouge, for the purpose of turning wooden bowls or dishes, and, in combination therewith, I claim the manner of regulating the thickness and size of bowls or dishes to be turned off, by means of the sliding or movable bottom, and the adjustable mandril and centre pin, for the purpose of turning wooden bowls or dishes in the manner set forth."

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41. For an *Improvement in Parlor Fire Grates;* E. Backus, Brooklyn, New York, September 25.

The patentee says,—"The construction is as follows:—In a common chimney piece a grate is set, the jambs of which are made hollow, the grate is furnished with two doors to increase the draught. Besides the ordinary outlet for the products of combustion, there are two others, one into each jamb, and when the throat of the grate is stopped, (which may be done by an ordinary lattice or other valve,) then the heat, smoke, &c., is turned into the side jambs, and passes out through a hole, in the front of the jamb, to which an oblique pipe is fitted, which conveys it into a radiator, or drum, in which there is a partition, that causes it to descend to near the bottom, thence it ascends, and passes back into the chimney, through another oblique pipe. These radiators, of which there are two, are four sided prisms, having any suitable ornament thereon, and are placed one on each side of the chimney piece; they stand on legs, and through them pass two or more pipes, open at top and bottom, through which the air of the room circulates. It will be seen that these radiators can be removed, when the weather is too warm to require their additional heat, and then the grate has only the characteristics of a common grate, and it is obvious that they can be replaced at pleasure."

Claim.—"What I claim as my invention, and desire to secure by

letters patent, is the combination of the removable radiators with a common open fire grate, substantially in the manner herein described, and for the purposes set forth."

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42. For an *Improvement in Propelling Railway Cars;* Ira Avery, Tunkhannock, Wyoming county, Pennsylvania, September 25.

The patentee says,—"The nature of my invention consists in providing air pipes, or tubes, made of a streng, flexible, and air tight material, such as leather, &c., placed lengthwise of the road—attaching to the cars, (or other body to be moved,) power or driving wheels, in such a manner as to run upon, or against, the pipes or tubes, and placed so near, as to stop or prevent the passage of the air at the point of contact. This arrangement being completed, the air is to be forced into the pipes, at the starting point, by means of steam, or other power, in any of the known ways of generating a current of air. The pipes being thus inflated behind the power or driving wheels, causes it to move forward as long as the current of air is kept up."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the application to railroads, and railroad cars, &c., the air pipe and driving wheel, so adjusting them that, when the air is forced into the pipe, it will impart to the wheel bearing upon it, a rolling motion, producing a forward movement to the body to which the driving wheel is attached."

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43. For an *Improvement in Hot Air Furnaces;* Walter Bryant, Boston, Massachusetts, September 25.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the radiator, constructed for the circulation of the smoke, &c., throughout its interior, and arranged for the removal of soot, &c., from the same, substantially as described; and also the combination of such a radiator with the smoke drum of the furnace, substantially as set forth."

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44. For an *Improvement in Operating Cut-Off Valves;* Henry T. Peake, Charleston, South Carolina, September 25.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the working of the cut-off valve with the same eccentric and arm as the slide valve."

List of American Patents which issued in the month of December, 1842, *with Exemplifications, by* CHARLES M. KELLER, *late Chief Examiner of Patents in the U. S. Patent Office.*

1. For an *Improvement in Metallic Pens;* Thos. Woodward, Brooklyn, New York, December 1.

The patentee says,—"My pen holder is intended to be used with metallic, or other pens of a like form, and one of its distinguishing fea-

tures is, that it is itself constructed of metal; it is perfectly elastic, yielding along its whole length to the action of the hand, as readily as a quill, and even more so, if desired, whilst it may be made lighter than such as have been heretofore made of whalebone, or other elastic material. Another distinguishing feature is the manner in which I sometimes form the lower end of said holder, as that it will adapt itself to steel, or other pens, varying from each other in width."

Claim.—"What I claim as new, and desire to secure by letters patent, is, first, the forming of an elastic, metallic, hollow stem, or handle, by winding a strip of metal spirally, so that it shall constitute a hollow, taper, or cylindrical tube. I also claim the manner of adapting said holder to the receiving, and retaining of pens, varying in width, by making a slit, or slits, in the end, or ferrule formed piece of metal, which is to retain the pen as set forth."

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2. For an *Improvement in the Kiln for Drying Grain;* Henry Y., and Abraham Houpt, Springfield, Bucks county, Pennsylvania, December 5.

Claim.—"What we claim as our invention, and desire to secure by letters patent, is passing the grain between two vertical cylinders, placed over a furnace, heated air being made to pass through the inner cylinder, and in a space between the second cylinder and a casing outside of it, as described."

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3. For an *Improvement in Tanning Leather by Machinery;* David H. Mason, Dahlonega, Lumpkin county, Georgia, December 5.

Claim.—"What I claim as my invention, and desire to secure by letters patent, consists, first, in the employment of a mill, whether made like the swinging stocks, or in any other form in which its action upon the skins is substantially the same, for the purpose of tanning, or otherwise operating upon skins, in the process of tanning; and, second, the forcibly working hides, or skins, in the mill denominated the swinging stocks, or other suitable machine, with tanning liquor, or working them partly in the mill with salts, and partly with tanning liquor."

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4. For an *Improvement in the Combination Tumbler Door Lock;* Robert M. Tuttle, Newark, New Jersey, December 5.

Claim.—"What I claim, is the combination of the protector, or protecting lever, with the wheels, to produce a security unattained, as I think, by other locks: that is to say, I claim to have invented that combined action of the wheels upon the protector, which, by a nice adjustment of the tumblers, allows the bolt to pass out and in, only when the tumblers are elevated by the unequal bits of the key, so as to relieve the bolt from resistance at the slot, and, at the same time, from the hold of the protecting guard."

5. For an *Improvement in Making Black Ink;* Peter Ferris, Greenwich, Fairfield county, Connecticut, December 5.

The patentee says,—"Into an iron vessel put twelve gallons of soft water, and six pounds of ground logwood, and boil it not less than three hours; strain the liquid through a fine wire sieve, or pour it off the sediment, and add the following thereto:—10 lbs. nutgalls, 3 lbs. copperas, 6 oz. blue vitriol, 4 lbs. gum arabic, 1 lb. loaf sugar, 1 lb. Prussian blue, and 1 lb. indigo. Boil these parts together five hours, and let it stand on the sediment 10 or 15 days, stirring it daily; then strain, or settle, the sediment from the liquid; if there be less than nine gallons, add water to make nine gallons, and add thereto one gallon of alcohol, 80 per cent. above proof, and stir it daily for 10 days, and let it settle for three days, and bottle for use."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the compounding the within named ingredients as described, for manufacturing ink."

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6. For an *Improvement in Steam Boilers;* A. W. Sharp and W. F. Horton, Honeoye Falls, Monroe County, New York, December 5.

The patentees say,—"The nature of our invention consists in so constructing the boiler, that the entire chamber and ash pit are surrounded with water, (excepting an opening for the door, and for the smoke pipe, and another small one in the end of the ash pit,) and in placing tubes within the fire chamber."

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the combination and arrangement of the several parts, as set forth, constructed as described: that is to say, of the boiler, constructed of double plates, and double heads, parallel to each other, so that the fire chamber, and ash pit, in combination with the hollow grate bars, and tubes, arranged as set forth, are surrounded with water."

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7. For an *Improvement in Steam Engines;* Alexander Connison, Great Britain, December 5.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is combining the two pistons, and the cylinder, with a three throw crank, the acting pistons of which are at a distance of 120 degrees apart, in such manner, as that the two pistons, and the cylinder, shall be made to vibrate to equal distances, and so as to allow of the introduction of steam into three compartments, or chambers, within the cylinder, to operate therein, for the purpose, and in the manner set forth.

"I also claim, as a modification of this plan, the causing of the piston heads to vibrate within a stationary cylinder, said heads being fitted to a cylinder in the manner of pistons, and their vibrations being simultaneous;—such heads traversing without the cylinder, in the same manner in which they would traverse with it, under the first described modification, and effecting the same purpose as the vibration of the

heads with the cylinder, and by means substantially the same;—these being, in either case, three distinct motions, namely, that of the two cylinder heads, and those of the two pistons, produced by a three throw crank, constructed and proportioned as set forth.

"I claim, also, the manner in which I have combined and arranged the respective parts of my rotary valve, as herein described. I do not claim to be the first inventor of a rotary valve, but I do claim to be the inventor of the combining of the tangent screw, the valve seat, the openings through that seat, and through the valve box, so as to be capable of adjustment, and to cause them to operate as set forth. I claim the manner of causing this valve to revolve, by means of a shackle-bar, held on a stationary joint pin at one end, and embracing a crank pin on the other, by which motion shall be given to the valve shaft.

"I claim the manner of letting the steam on between the two pistons, by means of a device as represented, by which means, the introduction of steam between the two pistons may be continued during the time required for that purpose."

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8. For an *Improvement in Lard Lamps;* P. Robinson, Chillicothe, Ohio, December 5.

Claim.—"What I claim as new, and desire to secure by letters patent, is so constructing the burner of the lamp, as to admit of the inserting of a number of small wicks, through a series of openings in the upper side of such burner, and the passing of said wicks, collectively, through a larger hole, adapted thereto, in its lower side; there being also a number of small holes perforated in the lower side of the burner, for the admission of the lard, or other fatty matter, the whole being constructed and operating substantially as set forth."

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9. For an *Improvement in Furnaces;* J. Clute and J. Seabury, Albany, New York, December 5.

The patentees say,—"Our improvement consists in the employment of a descending flue, or flues, down which the draught is made to pass, after it leaves the fuel in the chamber of combustion, or that part of the furnace which contains the fuel. In furnaces constructed on our plan, the supply of air is to be given by means of any suitable blowing apparatus, and by the obstructing of the draught, by the descending flues, and the forcing in of air by the blowing apparatus, a degree of pressure is produced in the interior of the furnace, which has been found highly favorable in economizing the heat, which is the more readily communicated to the article to be acted upon."

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the combining of the descending flues with an artificial blast, in furnaces, as set forth."

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10. For an *Improvement in Ships' Windlasses, or Capstans, and Cable Stoppers;* John Grylls, Great Britain, December 12.

Claim.—"I claim, firstly, constructing or making whelps, to be ap-

plied to capstans, windlasses, and other barrels of a like nature, with angular or inclined sides, by means of which the cable is prevented from suddenly surging, or running out, as is the case with the old whelp; and secondly, I claim the manner of constructing cable stoppers, with parallel surfaces, capable of holding on to a considerable length of cable at one time, the same being constructed as set forth."

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11. For an *Improvement in Metallic Pens;* Timothy Alden, Barre, Worcester county, Massachusetts, December 12.

Claim.—"I claim the method of constructing the parts of a metallic pen: that is to say, supporting the movable blades thereof upon pivots, or contrivances of like nature, (which permit said blades to separate from each other, during the process of writing,) in combination with a suitable spring, applied to, and operating upon, the shank of each of the said blades, the whole being arranged and operating substantially as set forth."

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12. For an *Improvement in Mortising and Tenoning Machines;* Warren L. Peters, Frankford, Philadelphia county, Pennsylvania, December 12.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the lever, arm, and spring, as described; also the combination of the springs and screws, with the carriage, for regulating its position as described."

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13. For an *Improvement in Combined Ploughs;* James Parsons, Jr., Dublin, Wayne county, Indiana, December 12.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the application of the regular turned mould boards and shares, either of cast or wrought iron, with cast or wrought iron, or wooden sheath, or standards, to shafts, for the purpose of ploughing two furrows, turning them inwards or outwards, by transferring the shares alternately, or by transposition from one side to the other, and working them in a separate or connected position; and the application of the gauge rod, for furrowing out ground, and two, or more, right or left hand shares, for ploughing in wheat or oats, in seeding, in the manner described."

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14. For an *Improvement in Surveying Instruments;* B. H. Benton, Middleburg, Loudon county, Virginia, December 12.

The patentee says,—"The instrument consists of a quadrant, with a geometrical table, and graduated arch, and two limbs connected by a joint. One limb is firmly connected with the quadrant, while the other limb is joined to the centre, in such a manner, as that it can move freely round over the quadrant, and remain in any given position, in which situation it can be secured by a screw, underneath which screw is attached to the said movable limb, at such a distance from the centre

of motion, as that it can move freely just under the arch of the quadrant. These limbs are both graduated, or laid off, in ten equal parts, and marked 1, 2, 3, 4, &c., beginning at the centre of motion;—these parts are subdivided into tenths. Each limb is furnished with a pair of sights, similar to those used in ordinary surveying instruments,—which sights are fastened down by screws. On the stationary limb there is a spirit level, and a box containing a magnet needle. This box can be removed at pleasure, and can be connected, by means of screws, to either limb. The instrument, when in use, is placed on a staff, by means of a ball and socket, which socket is attached underneath the quadrant, about equal distance from the centre and the quadrant arch."

Claim.—"What I claim as my improvement, and desire to secure by letters patent, is combining with a quadrant, (or quadrant with a geometrical table,) a movable limb, or index, graduated in the manner set forth."

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15. For an *Improvement in Bedsteads;* Charles W. Curtis, New Haven, Connecticut, December 12.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of light hoop-metal bands, with metallic frames of flexible bars, suspended by the loops, and supported as set forth."

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16. For an *Improvement in Laying Off Corn Rows, &c.;* Peter Moseley, Yazoo county, Mississippi, December 12.

The patentee says,—"The nature of my invention consists in forming a level, or horizontal plane, by sight, to measure from, by means of a portable plumb staff, with a movable staff, with a movable object suspended on it, to sight to, the plumb staff and movable object operating as a moving gauge, to measure or gauge from the horizontal sight, as a guide."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the mode of laying off rows, for farmers to plant on, say corn, cotton, or any other thing, by the application of a horizontal sight to gauge or measure from."

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17. For an *Improvement in Wigs;* William Dowell, Philadelphia, Pennsylvania, December 12.

The patentee says,—"The wigs which have heretofore been made in one piece, are, under this improvement, made in two pieces, namely: the one consists of the scalp, intended to cover the top of the head, the other of the rim, intended to encircle it."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the making of the wig in two separate parts, which, when permanently secured behind, allows the scalp to be brought over the rim, in front, two or three inches, where those parts are fastened together, and admits of being extended after shrinking, as set forth."

18. For an *Improvement in Washing Machines;* F. Fentriss, Greensborough, Guilford county, North Carolina, December 12.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the manner of arranging and combining the paddles with the box, so that said paddles may have their alternate cotemporaneous motion, up and down the sides of the open box, in the manner set forth."

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19. For an *Improvement in Boot Crimps;* Bradford Rowe, Maryland, Otsego county, New York, December 17.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the combination of the pincers with the removable crimp, as constructed and operated in the manner set forth."

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20. For an *Improvement in Door Locks;* John P. Sherwood, Sandy Hill, Washington county, New York, December 17.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the peculiar construction, and double action, (upon an inclined and horizontal track, or way,) of the locking car, as described, and the combination of the locking car, and safety cars, with one another, and with the connecting or vibrating bar and bolt, so as to fasten the bolt securely, and prevent its being picked."

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21. For an *Improvement in Chimney Caps;* Jordan L. Mott, City of New York, December 17.

The patentee says,—"A distinguishing feature of my chimney cap is, that, although consisting of a vertical, surmounted by a horizontal, tube, it is not made to revolve, like the greater number of instruments for the same purpose, but is fixed permanently on the top of a chimney, or flue. Its vertical tube must be of such size, as shall adapt it to the chimney, or flue, upon which it is to be placed; and this vertical tube opens into a horizontal tube, that is open at both its ends. The horizontal tube I usually form of two conical frustrums, of equal length, united together at their smaller ends, where their diameter should be about equal to that of the vertical tube which enters them, and the whole length of said horizontal tube, may be equal to about three times the diameter of the vertical tube. I sometimes make the horizontal tube cylindrical at its middle portion, where the vertical tube enters it, and attach a conical frustrum at each end of said cylindrical part."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the forming of the horizontal tube, which is open at both ends, of two hollow, conical frustrums, which are to be united together at their smaller ends; or of two such conical frustrums, connected together by an intermediate cylindrical tube, at, or near, its middle, and the instrument, when thus formed, being permanently fixed upon the chimney, or flue, through which an upward draught is to be produced, the whole being combined, arranged, and operating, as set forth."

22. For an *Improvement in Chimney Caps;* Jordan L. Mott, assignee of Thomas Ewbank, City of New York, December 17.

The patentee says,—"My ventilator, or chimney cap, consists of a vertical tube, which is to be placed upon the top of the flue, or chimney, in the ordinary manner, and this vertical tube is surmounted by a tube, placed horizontally upon it, and into which it opens; this horizontal tube is open at both ends, and is so combined with the vertical tube, as to revolve upon it, and thereby enable it to take the direction of the wind, as is usually the case. My improvement consists in the manner in which I form this horizontal tube, by which the action of the wind upon it, in producing an upward draught in the flue, or chimney, is rendered much more effective, than in the ventilators hitherto known and used. This horizontal tube consists of a conical frustrum, which is so placed upon the vertical tube, as that its larger end shall be at a considerably greater distance from it, than the smaller end."

Claim.—"What I claim as new, and desire to secure by letters patent, is the giving of a conical form to the horizontal tube, from one end thereof to the other, or through the greater part of its length, the longer end of said conical tube extending to a distance beyond the vertical tube, much greater than that of the shorter end. I also claim the combining of the conical, or flaring, rim, with the horizontal tube of my ventilator, constructed as described. And I likewise claim the combining of a projecting piece of sheet metal, with such horizontal tube, at the rear of the opening of the vertical flue, the whole being formed and arranged as set forth."

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23. For an *Improvement in Machinery for Breaking Flax and Hemp;* J. P. Fry, Pulaski, Giles county, Tennessee, December 21.

Claim.—"What I claim as my improvement, and desire to secure by letters patent, is sloping the swords, or blades, on their upper edges, from the middle thereof, to their outer or smaller extremities, in the manner set forth."

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24. For an *Improvement in Bee Hives;* William Bryant, Nashville, Tennessee, December 21.

The patentee says,—"The nature of my invention consists in compelling the bees to exclude themselves from that part of their honey which it is desired to take from them, by placing a gate, (which, with the wood in which it is fixed, I call the bee trap,) across their passage, which gate they can pass in leaving their honey, but cannot repass it to return to their honey."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is affixing the bee trap across the bee passage, in that manner, that the teeth of the gate can rise, or open, only outwards from the hive, and permit the bees to exclude themselves from their honey."

25. For an *Improvement in Fastening Door Locks and Latch Knobs to their Spindles, &c.;* Andrew O. Downer, Utica, New York, December 21.

The patentee says,—"The nature of my invention consists in the contrivance of a new mode of fastening, and holding, the knobs to the door, and still allowing them to be turned easily with the hand, to lift the latch."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the mode of fastening knobs to the door, by the use of plates, and their connexion with the knobs and spindle, by which the article is made capable of being readily adjusted to any thickness of the door, and then secured in a simple and substantial manner."

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26. For an *Improvement in Filters;* Thomas Bishop, Dobbs' Ferry, West Chester county, New York, December 31.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the application of the tube to a filter, in an air-tight cask, or other vessel, to equalize the exhaustion or pressure of air, in the two chambers made by the filter, that water may be filtered by its own weight, without being obstructed by the air in the lower chamber, and enabling the pump, or cock, by one operation, to draw filtered water, and to supply the filter anew, with water to be filtered, without disturbing the operation of the filter."

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27. For an *Improvement in Lamps;* W. F. Shaw, Boston, Massachusetts, December 31.

Claim.—"What I claim, is the arranging the solar cone, and ducts, for the outer current of air, upon a tube, or other contrivance of like nature, which may be slipped over the outer tube of the burner of the lamp, and which may be removed therefrom at pleasure, to admit of a substitution of the ordinary apparatus by which the chimney is supported, and by the aid of which, the wick is elevated or depressed, the whole being arranged and operating as set forth. Also the combination, with the cone, or cone plate, of a circular plate, applied to the tube a short distance below the cone plate, in order that the current of air, which is supplied to the outside of the flame, may be introduced into the solar cone in a thin sheet, and be protected, by said plate, from the action of other atmospheric currents, which would be likely to affect the operation of the said external current upon the flame; the whole being arranged as described."

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28. For an *Improvement in Copying Machines;* L. Carpenter, Oswego county, New York, December 31.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is, first, the construction and combination of the two groove bars, so as to constitute two combined and variable axes of motion to the compensating lever. 2d, The combination and adjustment of the

square and oblong, with the two groove bars, so as to impart the motion of the lower end of the compensating lever to the square."

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29. For an *Improvement in Pumps;* William and Benjamin Douglass, Middletown, Middlesex county, Connecticut, December 31.

The patentees say,—"The nature of our invention consists in constructing a pump in such a manner, that it may be conveniently adapted to any part of a dwelling, or other place, where the room is cramped; also so that the lower box, or valve, may be got at with much less difficulty, than in the old and ordinary way; and in having the stand, to which the brake is attached, permanently secured by set screws, uniting with a stirrup beneath a projection in the cylinder, and also the manner of securing the lower valve in its place."

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the revolving stand to which the brake is attached, and the mode of securing the lower valve in its place."

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30. For an *Improvement in the Rotary Steam Engine;* Wm. Jones and Roswell Farnum, Bradford, Orange county, Vermont, December 31.

Claim.—"What we claim as our invention, and desire to secure by letters patent, is the revolving circular valve, or hub, constructed with the slot on one side, grooved or channelled on the other, and an aperture passing through it, placed in a grooved or circular recess, in the bottom of the cylinder; and operated by the piston, by the means described; the whole being constructed, and operating, substantially as described;—in combination therewith, the arrangement of the condenser as set forth."

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31. For an *Improvement in Ditching and Embanking Earth;* Horace Cleveland, Fort Wayne, Whitley county, Indiana, December 31.

The patentee says,—"My ditching machine is in the general form of a double mould board plough, the respective parts of which are attached to a beam furnished with a clevis, by which it is to be drawn forward. In front of the share and mould board, it is furnished with three cutters, which are made fast at their upper ends to the beam, and to cross-trees attached to the beam, for the purpose of holding them. One of these cutters is in a line with the middle of the beam, and descends down to the level of the double share, and the sole of the plough, and is, at its lower end, nearly in contact with the point of said share. The other two cutters are designed to cut the two sides of the ditch, and are so placed, as to give to those sides the proper inclination, or slope, from top to bottom; their lower edges terminate on each side of the double share, near to the rear ends or angles of its cutting edges. The earth, after being divided by these cutters, is elevated by what I denominate the lifters, which rise in the manner of inclined planes, and extend along the lower edges of each of the mould boards,

their rear ends being at such height, as to be above the surface of the ground upon which the excavated earth is to be thrown. The rear and lower edges of the mould boards rise upwards, so as to coincide with the upper sides of the lifters, and, by the concurrent action of the two, the earth is thrown out of the ditch, and two embankments are formed, one on each side of it."

Claim.—"What I claim as new, and desire to secure by letters patent, is the manner in which I have combined the lifters and the mould boards, with the double share, and middle and side cutters, so as to constitute a machine for ditching and embanking, arranged and operating substantially as set forth."

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32. For an *Improvement in Water Wheels;* S. L. Valentine, Bangor, Maine, December 31.

The patentee says,—"My improvement is in that variety of wheels commonly called re-acting wheels, and consists in my peculiar manner of constructing the wheel, and buckets attached to the same, to allow of the wheel being cast in one piece, without any injury resulting from the contraction of the metal, in cooling, and also to produce a better effect."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the concavo-convex construction of the wheel, being convex on one side, and concave on the other side, from the periphery to the shaft, in combination with the buckets and rim, constructed and arranged as set forth."

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33. For an *Improvement in Sounding Instruments;* Henry S. Stellwagen, Philadelphia, Pennsylvania, December 31.

The patentee says,—"Operation.—As the weight descends, the resistance of the water will cause the valve to rise on the cylindrical part of the stem, and rest against the under side of the large end of the weight, and the valve to fall upward. When at the bottom, the cup enters the sand, or mud, and is filled. It is then drawn up, and, in ascending, the motions of the aforesaid valves will be reversed by the resistance of the water—the valve spreading over the mouth of the cup, and a valve descending upon it, to hold it firmly down upon the edge of the cup."

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the before described apparatus, for bringing up specimens of the bottom, at sea, for the uses of marine surveying, and navigation generally."

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34. For an *Improvement in Inclined Water Wheels;* John T. Gilmore, Fayetteville, Cumberland county, North Carolina, December 31.

Claim.—"This wheel combines two principles—percussion and gravity; the latter is in constant operation, so long as the water remains in the bucket, during the revolution of the wheel. This is so, because the wheel is made to run slower than the water would descend on a

smooth surface, having the same inclination as the wheel. I do not claim to be the inventor of the inclined wheel; but I do claim the invention of the inclined water wheel, with buckets as described, in such a manner as to combine percussion and gravity, as set forth. I therefore desire to secure by letters patent, only the inclined water wheel, constructed with buckets, as described, to be applied to any machinery propelled by water power."

MECHANICS, PHYSICS, AND CHEMISTRY.

Translated for the Journal of the Franklin Institute.

Account of the Experiments to determine the Principal Laws and Numerical Data, which enter into the Calculation of Steam Engines. By M. V. REGNAULT.

EIGHTH MEMOIR.

On the Elastic Force of Steam at Different Temperatures.

(Continued from page 335.)

After briefly citing the principal authors of experiments upon this subject, (among which the Committees of the French Academy of Sciences, and of the Franklin Institute, are particularly referred to,) M. Regnault remarks, that further researches are rendered necessary by the disaccordance among former results. The fact also shewn by him in a previous memoir, that mercurial thermometers could not be relied upon at temperatures above those of the fixed points by which their scales were graduated, indicates the necessity of repeating the observations, with attention to the proper corrections for this source of error.

The memoir is divided into three parts. The first part includes the experiments upon the elastic force of the vapor of water, at low temperatures: that is, from $-32°$ to $+50°$ ($-25°{\cdot}6$ to $+122°$ Fahr). The second includes the experiments made between 50° and 230° (122° to 446°). Finally, in the third part, the graphic representation of the experiments is studied, and the formulæ of interpolation which represent them sought.

FIRST PART.—*Of the Elastic Force of the Vapor of Water at Low Temperatures.*

M. Regnault remarks that, to establish any physical datum with precision, it is not sufficient to examine it by a single method of experimentation. If the results disagree with those already admitted in the science, it will be most frequently difficult to decide which ought to be preferred; there will be nothing to guide us in our choice, except the more or less favorable opinion which we may entertain of the process employed, or the greater or less confidence which we have in the skill of the experimenter. To remove all doubts, it is necessary to make the experiments by various processes, and to employ even the same processes which were used by preceding investigators, except

where these are absolutely defective. We must shew that all these processes, when properly conducted, lead to the same results; or, if they do not, shew by direct experiment, the causes of error. This method is long and troublesome, but it is the only one likely to introduce into physical science, accurate numerical data.

I. Almost all the experiments upon the elastic force of the vapor of water at low temperatures, have been made by two barometers, dipping into the same cistern of mercury;—into one of the barometers a small quantity of water is introduced, which rises into the vacuum. The difference of height of the mercury in the two tubes, which are, in other respects, under identical circumstances, marks the tension of the vapor at the existing temperature. The difficulty of determining this temperature exactly, constitutes the greatest uncertainty in this method of operating. Most philosophers, who have employed this method within the limits of atmospheric temperatures, have contented themselves with placing a mercurial thermometer alongside of the tubes, at the height of the chamber, whose indications were regarded as giving the temperatures to which the tension corresponds. M. Kœmtz has made, in this way, a long series of observations, during two entire years, and thus obtained the elastic force of watery vapor, from —19° to +26° (—2°·2 to +78°·8 Fahr).

The same processes have been employed by various philosophers, for temperatures above those of the atmosphere. In this case, the barometers were placed in a glass envelope filled with water, the temperatures of which were successively raised. Dalton placed only the wet barometer in a second larger glass tube, closed below with a cork, through which the barometer tube passed;—he filled the interval between the two tubes with water, brought successively to different temperatures.

This method is not susceptible of great precision, for it is impossible to keep a column of liquid, of any height, at a uniform temperature, without continually agitating the liquid, and in Dalton's experiments, there was no method of rendering the temperature stationary, for a time sufficiently long for the column of mercury to place itself in equilibrium of temperature with the surrounding air.

M. Regnault made a series of observations in this manner, in which every precaution was used to avoid sources of error. The envelope was 23 centim. (9 in.) in diameter, provided with an agitator, and the temperature was measured by a mercurial thermometer, immersed in the water at the height of the columns of mercury. When the proper corrections were made, the results given by this apparatus were identical with others, got by a method afterwards described, and are, therefore, not reported.

M. Regnault remarks that this method furnishes very accurate results, for temperatures equal to, or a little above, the surrounding temperature; but ceases to be rigorous for temperatures somewhat higher: the uncertainty arising from the rapid division of the column of liquid, into strata of different temperatures, as soon as the observer ceases to stir it, for the purpose of reading the height of the mercury. Another

series of experiments was made with two barometers, one dry, the other wet, not heating the whole column, but only the upper portions.

Experiments can be made in this way with great precision, at the surrounding temperature, and may be repeated as often as is desirable. With a little practice, it is also easy to keep the small column of water of uniform heat, at higher temperatures. Three or four observations were made at the same temperature, leaving an interval of eight or ten minutes between every two consecutive observations. Sometimes the temperature of the bath was intentionally suffered to rise, or to fall, in the interval between two observations, and then again rendered stationary, by regulating the lamp by which it was heated. It was thus easily seen, that the movements of the mercurial column followed the slightest variations of the thermometer, and identically the same tensions were found, whenever the thermometer indicated the same temperature.

Direct experiments shewed that the part of the mercurial column immersed in the bath, had precisely the same temperature as the water, although it was lying upon a colder column, and that the conditions of the two columns were identical, with the exception of the introduction of the water into one.

The results were reduced to 0°, and corrected for the small column of water in the wet barometer, and for the effect of the capillary attraction of the water, and the results given in tabulated form.

II. The second series of experiments was tried with the following apparatus: A glass globe, of about 500 cubic centim. (30 cu. in.) incloses a small glass bubble, filled with recently boiled water. The globe is welded to a bent tube, which is cemented into a copper tube with three branches, into one of which is cemented another glass tube, welded into the top of a tube similar to a barometer tube. The third branch of the copper tube communicates, by means of a glass tube, 1 metre in length, filled with pumice stone, soaked in sulphuric acid, with an air pump. The barometer tube is arranged vertically, alongside of a true barometer, their upper parts passing into a sheet-iron trough, in which the glass globe is also placed.

The apparatus being thus arranged, a vacuum is made a great number of times, and after each time, the air is suffered to enter slowly through the drying tube. After this has been done forty or fifty times, the globe and barometer tube may be considered perfectly dry; a vacuum is then made as perfectly as possible,—the pump used carried it to below 1 mm. (·039 in.)—and the small tube, communicating between the apparatus and the drying tube, closed by the lamp. The globe was then surrounded by ice, and at the end of some time, when the equilibrium of temperature is established, the difference of height of the two mercurial columns is taken by cathetometer; we thus get the elastic force of the air remaining in the globe at 0°. The ice is then removed, and the globe heated gently, at the place where the bubble rests, until this is broken by the expansion of the liquid within it; the ice is then restored, and after the temperature of 0° has been established, a new observation is taken of the difference of heights of the columns in the two barometers. The first difference subtracted

from this, gives the tension of the vapor at 0°. In order to get the tensions at their higher temperatures, the ice is replaced by clear water, which may be heated to the proper temperatures, and the observations are made as before. In order to obtain these measurements, a pane of well selected glass is inserted in one side of the trough, opposite to the barometer tubes. Proper care was taken to avoid error, by the displacement of the marks observed by the refractions of the water and glass.

The barometer used in these experiments was carefully compared with a standard. It was also shewn to be free from air, by another method of verification, which consists in raising or lowering, as far as possible, the level of the mercury in the cistern; if the vacuum be perfect, the height of the mercurial column above the level of the cistern, will remain always the same, but this will not be the case, if the space above the mercury contains air. This method of verification was long since suggested by M. Arago. The same apparatus is very suitable for observations in the tension of the vapor, at temperatures lower than 0°. For this purpose, a glass jar is substituted for the sheet-iron trough, and a saturated solution of chloride of calcium for the water. The temperature of the solution is reduced, by the addition of ice, or it may be raised, if necessary, by adding a portion of the solution heated. This is used in place of water, to avoid reducing the frigorific power of the solution, in case it is desirable to lower the temperature again. It is evident that the nearer the temperature approaches that of the surrounding air, the more easily it is kept stationary; in this case, too, the variation of the elastic force with the temperature is most sensible. Below —20° (—4° F.) a change of some tenths of a degree in the temperature, produces but insensible variations in the elastic force of the vapor of water. This apparatus may also serve for experiments, at temperatures somewhat higher than that of the surrounding air; but if the temperature be raised more than 10° or 15° (18° or 20° F.) above this, the water of the globe distils, and condenses in the tubes, and the observations become uncertain. A simple modification of this apparatus, will serve to determine the tension of aqueous vapor in air more or less rarefied, in order to determine whether this is the same as in vacuo. The experiments on this subject have already been published in M. Regnault's memoir on Hygrometers. (*Annales de Chimie et Physique, 3e serie, tome* XV, *p.* 130.)

It is absolutely necessary to dry the globe thoroughly before breaking the bubble. To ascertain whether this was done in the method just related, the apparatus was modified by inclosing the bubble in a separate tube, so as to allow the globe to be heated while under repeated exhaustions by the air pump. The value thus obtained, for the elastic force of the vapor at 0°, is rather less than that obtained by the other method.

Finally, this apparatus was also used to determine the tension of the aqueous vapor in an absolute vacuum. For this purpose, the water was at once placed in the globe. The apparatus being arranged as usual, a vacuum is made by the air pump, and the globe gently warmed, when some water distils over, and condenses in the barometric

tube. By continuing the exhaustion, a continual distillation of the water is produced from the globe and the tube, which water condenses in the drying tube. After distilling, in this way, several grammes of water under a very feeble pressure, it may be admitted that the air is completely expelled from the apparatus. The tube communicating with the air pump is then hermetically sealed, and the observations made as usual.

III. M. Regnault describes another form of apparatus, applied by him for the determination of the elastic forces of the vapors of very volatile liquids; but as it has never been used by him for the vapor of water, and is not regarded by him as capable of giving results as accurate as the others, we omit its description.

IV. *Of the Tension of the Vapor of Mercury.*

In the most of the preceding experiments, the column of mercury which transmits the pressure, is heated to the same temperature as the vapor whose tension we are measuring, and sometimes the space in which the vapor is developed, is in easy communication with the tube holding the mercury. Now if, within the limits of temperature at which we operate, the tension of the vapor of mercury was notable, this tension might have been added to that of the liquid under examination, and thus have rendered our determinations inaccurate.

Two series of experiments made by the apparatus which we have described, mercury being substituted for water,—in one of which series a notable quantity of air had been left in the apparatus, while in the other, the vacuum was made as perfect as possible,—gave results so discordant, as to be worthless as measurements of the relative tensions of mercurial vapor at low temperatures. The differences, however, though relatively great, are actually within the limits of errors of observation, and they suffice to shew that the tension of the vapor of mercury, at 100°, (212° F.,) is about 0·5 mm.; (0·02 in.;) and that at 50°, (122° F.) it scarcely reaches 0·1 mm. (0·004 in.)

Below 50° it is almost negligable, and M. Regnault did not judge it necessary to introduce this correction into the tables, because it is not sufficiently certain, and is of the same order as the errors of observation.

Part Second.—*Of the Elastic Force of the Vapor of Water at High Temperatures.*

The methods explained in the preceding part of this memoir, are suitable only for temperatures below 60° or 70°. (140° or 158° F.) At higher temperatures, the water divides itself into layers of unequal heat, so that a continual agitation is necessary to prevent this separation. These methods, moreover, become altogether impracticable at temperatures above 100°. (212° F.) For higher temperatures, therefore, M. Regnault had recourse to a method long known, and employed by several experimenters, especially by MM. Arago and Dulong: that is, observing the temperature at which the water boils, under given pressures. It presents the advantage of being applicable to the heaviest pressures, and it gives very exact results when it is properly applied.

In the apparatus of MM. Arago and Dulong, (*Ann. de Chim. et de Phys., 2e serie, tome* xliii, *p.* 74,) the water did not actually boil; its elastic force increased, by the heat, up to a certain maximum, which was measured on a manometer, (air pressure-gauge,) at the same time that the thermometers immersed in the water and steam were observed. At other times, the manometer and thermometers were simultaneously observed, while the temperature was still rising, and had approached a maximum. It is to be feared, in this way of observing, that the thermometers, which are necessarily a little behind the temperature of the steam, have not attained the same temperature with it, at the time that they mark their maximum. The error which could arise hence, is probably very small, or even insensible, in experiments made at very high pressures, because, in this case, a very small difference of temperature corresponds to a great change of elastic force; but the error will probably not be negligable under light pressures, as, for example, under such as are less than that of the atmosphere.

It is easy to avoid all objections of this kind, in this process, by arranging the experiment under conditions identical with those under which water is boiled, under the ordinary pressure of the atmosphere, for the purpose of determining the fixed point, 100° of the thermometric scale; and the temperature at which water boils, under different pressures, may then be determined with the same precision. For this purpose, it suffices to cause the water to boil, in a vessel communicating freely with a somewhat large space, in which the air may be compressed or dilated at will;—this air forms an artificial atmosphere, exercising a pressure on the surface of the heated liquid. A temperature of ebullition may be thus obtained, as perfectly stationary as that which water presents, when it boils in the open air; and this temperature may be kept stationary as long as we please.

But before arranging the apparatus by which the experiments might be tried under heavy pressures, and which must necessarily be expensive, M. Regnault thought proper to try the process upon a smaller scale, so as to study the various circumstances, and detect the causes of error which presented themselves.

This apparatus consisted of a copper alembic, with a cover of the same bolted to it, through which cover passed four iron tubes, nearly filled with mercury, for the purpose of holding the thermometers.—Two of these tubes passed nearly to the bottom of the alembic, so that the thermometers contained in them, were below the water level; and the other two reached to such a depth only, that their thermometers indicated the temperature of the steam. The neck of the alembic opened into a tube a metre in length, surrounded by another much larger tube, through which a constant current of cool water was kept, for the purpose of condensing the steam. This condensing apparatus opened into a copper globe of 21 litres (6½ galls.) capacity, which could be connected, by one adjutage, either with the barometer apparatus, used in the previously described experiments, or with the open air manometer, described in a former memoir; and by another adjutage, with an exhausting or condensing pump, at pleasure. It is not necessary that we should copy the detailed account of the method of experimen-

tation with this apparatus. Care is, however, necessary in determining the position of the meniscus which oscillates in this apparatus; with attention, however, a point of time can be easily found, when it remains stationary, and the oscillation never exceeds 0·1 mm. (0·0039 in.) The thermometers were read by telescope, at a distance, for the purpose of avoiding the effects of parallax.

The thermometers used in this apparatus were mercurial, with the common straight stems; a part of the column of mercury necessarily rose above the cover of the alembic, and was, of course, not at the same temperature as the steam, and consequently required correction. This correction would be easy, if we knew the mean temperature of this column with sufficient precision. When the stem is in the open air, the different points of the column, above the steam, are at different temperatures, according as their distances from the cover are greater or less. Disapproving, for reasons which he assigns, of the mode by which MM. Arago and Dulong sought to remedy this evil, M. Regnault made use of the common straight stem thermometer, so adjusted that but a small portion of the tube should rise above the cover of the alembic, and admitted this small column to have a mean temperature, equal to that which was indicated by a small thermometer placed opposite the middle of the projecting column. That this correction was sufficiently exact, he satisfied himself by the following experiments.

A very accurate thermometer, perfectly free from air, and having a range from 0° to 100°, had, at the upper extremity of its tube, an enlargement of the bore, into which a portion of its mercury could be discharged. The 0° of this thermometer was taken with the greatest care in melting ice, and 100° in boiling water, the whole stem being immersed in the vapor. This thermometer was immediately placed in one of the tubes of the alembic, in which water was boiling under the atmospheric pressure; a portion of its tube projected from the cover. The temperature indicated by the thermometer was corrected for the portion of the stem not immersed, by supposing the temperature of this part the same as that indicated by a small thermometer, whose reservoir was placed at its middle. This temperature, thus corrected, was found identical with that which had before been obtained, when the whole stem was immersed in the steam. But this experiment was not sufficient to establish the accuracy of the correction, since we must still assume that the thermometer immersed in the mercury, in the tube, indicated exactly the temperature of the steam. This was shewn to be the fact by direct experiment. A little of the mercury was discharged into the upper pouch of the instrument, so that, when the thermometer was again immersed in the tube, the water boiling in free communication with the air, the mercury rose only a few millimetres above the cover. The division reached by the mercury, was marked with the greatest care by the telescope of the cathetometer, and the instrument was then placed in the apparatus, for determining the fixed point 100°. It was impossible to detect the least difference between the points to which the mercury rose in these two cases, although a centigrade degree occupied six divisions of the scale.

To determine the correction for the unimmersed part of the stems,

at high temperatures, the comparison was made between their indications, and those of an overflow thermometer, which was completely immersed. These experiments were made at temperatures of 120°, 130°, and 140°, and it was found that, within these limits, the corrections made by assuming the mean temperature of the emerging column, as that indicated by a thermometer placed at its middle, were sufficiently accurate.

The thermometers employed in the experiments at pressures below the atmosphere, were graduated from 0° to 100°. They had six or eight divisions to a degree, and it was consequently easy to read, with certainty, to $\frac{1}{60}$ of a degree, ($\frac{1}{33}$° F.) The four thermometers used for higher pressures, were graduated from 0° to 240°. The degree centigrade corresponded to from 2·5 to 3 divisions of the scale. All these instruments were graduated and verified by M. Regnault himself, with the greatest care.

In the tables of the experiments, the temperatures of the thermometers immersed in the water, are given separately from those in the steam. In the boiling of water at low pressures, the thermometer plunged in the water, marks a temperature notably higher than that in the steam. This difference, which amounts to 0·7°, (1·12° F.) under very low pressures, gradually diminishes as the boiling point rises, until at the boiling point under atmospheric pressure, it becomes insensible.

The experiments made in this way at low pressures, present as perfect a concordance as could be desired, with those by the previously described methods, which, however, M. Regnault thinks are preferable for low temperatures.

M. Regnault also presents several tables of results, obtained by various experimental philosophers, on the boiling point, and corresponding barometric pressure at various points, of different heights, upon the surface of the globe. The difference between their observed results, and those calculated from the formulæ founded on M. Regnault's experiments, rarely amounts to $\frac{1}{700}$. The greatest amounts to $\frac{24}{770}$ of the pressure, and corresponds to a difference of 0·1° Cent. (0·18° F.)

Experiments with the large Apparatus.

The preceding experiments having convinced M. Regnault of the accuracy and perfect regularity of the process just described, he determined to construct the principal apparatus upon the same principles. This apparatus, intended for the study of the elastic forces of steam at high temperatures, is composed, 1st, of a boiler; 2d, of a condenser; 3d, of an artificial atmosphere; 4th, of a mercurial manometer; 5th, of a forcing pump.

1st. The boiler was of copper, 5 mm. (0·2 in.) thick; the joints rivetted and brazed. Its height 0·8 m., (2·63 ft.,) its diameter 0·35 m.; (13·783 in.;) its total capacity about 70 litres. (18·5 galls.) Its copper cover was 12 mm. (0·46 in.) thick, and was fitted to the cylinder with a red-lead joint, and secured by screw-bolts. This cover carried three copper tubes, closed below, screwed and brazed into it, and passing into the boiler. Two of these tubes, each 10 mm. (0·4 in.) in interior

diameter, and 1 mm. (0·04 in.) thick, were intended to hold mercurial thermometers; one of these descended nearly to the bottom of the boiler, and is intended to indicate the temperature of the water; the other did not reach the water-line, and is intended to give that of the steam. The third tube, 32 mm. (1·26 in.) in interior diameter, and 1·5 mm. (0·06 in.) thickness, was to hold the air thermometer, and did not reach the water level. The thermometers in these tubes were immersed in linseed oil. The boiler was placed on a sheet-iron furnace, provided with a long chimney, and the registers necessary for regulating the draught. It was strengthened externally, by iron bands.

2d. The refrigerator was made of a copper tube, 30 mm. (1·18 in.) in diameter, fixed to the neck of the boiler by a red-lead joint. This tube, for a length of 1·6 metre, (5·33 ft.) was surrounded by a much larger pipe, through which a current of cool water was made to circulate.

3d. The air reservoir was formed by a copper cylinder, 2 metres (6·56 ft.) high, and 0·42 metres (16·6 in.) in diameter;—its cubic capacity was, consequently, 280 litres. (73·892 galls.) Its walls were 13 mm. (1·536 in.) thick; the joints were rivetted while hot, and then soldered, so as to close them absolutely hermetically. This cylinder was fixed at a proper height, by strong iron collars, firmly fixed in the wall. It carried a bronze adjutage at each extremity, by the lower one of which it was put in communication with the condenser, and, consequently, with the boiler. The connexion was made by a red-lead joint. The upper adjutage put the reservoir in communication, on the one hand, with the condensing pump, and on the other, with the manometer.

4th. The manometer, intended to measure the pressure in the reservoir, and, consequently, that in the boiler, is the open mercurial manometer, described in the Sixth Memoir. (See p. 193.) This manometer is far preferable to those constructed with compressed air, which are ordinarily employed. These latter assume the absolute accuracy of the law of Mariotte at high pressures, and present the very great inconvenience of being less sensitive, in proportion as the pressures to be measured are greater. But the open manometer can only be employed in apparatus where the pressure can be regulated at will, and then kept constant for an indefinite period; which condition is not realized in any of the apparatus which have hitherto been contrived for the purpose of studying steam of high pressure.

5th. The air pump consisted of three single-acting cylinders, of 5 centim. (1·969 in.) interior diameter, and 14 centim. (5·5 in.) stroke; thus the volume of air driven out at each stroke, is 275 centim. cube. (16·78 cu. in.) The piston rods work in guides, and are worked by cranks, from a horizontal axis, provided with a winch at each end.—When the air condensed in the reservoir, does not exceed a pressure of 10 atmospheres, two men at the winches are sufficient to work the pump; but at a pressure of 20 atmospheres, four men are necessary.

The mercurial thermometers used were those formerly experimented with, and shewn to accord accurately throughout their whole scales. The mercury in their stems, never rose more than 1 or 2 centim. above

the cover, and therefore needed no correction. But it was found that, when the temperature exceeded 180°, (324° F.,) it was necessary to allow the column to rise a little more, say 3 centim., (1·18 in.,) in consequence of the mercury distilling and re-condensing in the upper part of the tube.

The air thermometer was similar to those before described.

After this detailed description of the parts of the apparatus, it will be easy to understand the general method of observing.

The water in the boiler being brought nearly to the boiling point, the air is compressed in the reservoir, so as to obtain nearly the pressure under which the observation is to be made. The mercury is then properly adjusted in the manometer, by compressing the air in the cistern with which it is connected, and when the column has risen to the proper height, by turning a stop-cock, all connexion between the tube and cistern is cut off, and then, by another stop-cock, the pressure upon the cistern is discharged. During this time, the water in the boiler has reached the boiling point;—the ebullition is kept up for at least half an hour, and the observations are not commenced until the mercurial thermometers, in the boiler, are absolutely stationary. The mercury in the gauge of the air thermometer, is then brought to the mark traced upon its tube.

One observer records the mercurial thermometers of the boiler, and makes the observations necessary for the calculation of the air thermometer. Two others simultaneously read the levels of the mercury in the two branches of the manometer, by means of two cathetometers, and then observe the thermometers placed along the column. It is important that these levels should be noted at the same moment; it is, therefore, done by a signal given by one of the observers, at a moment when the oscillations of the column are insensible.

When the pressure upon the apparatus does not exceed 5 or 6 atmospheres, these oscillations are scarcely perceptible, even in the telescopes of the cathetometers, which magnify highly, and the columns of mercury sometimes remain completely at rest, for more than a quarter of an hour. The slight variations of elastic force are due only to slight changes of temperature which the reservoir experiences, and might have been completely suppressed, if it could have been placed in a vessel of water. When the pressure surpasses 8 or 10 atmospheres, the oscillations of the columns become more sensible, but they never reach ½ mm. The changes which the elastic force of the air experiences, from variations of the temperature in the reservoir, are greater at high pressures, but whenever these were at all notable, they were observed to be accompanied by corresponding variations in the indications of the thermometers in the boiler.

All experimental philosophers know how difficult it is to retain perfectly, air compressed under heavy pressures, and it was only by infinite care in the adjustment of the various parts of the apparatus, that this condition was satisfied with a perfection that had not been hoped for. It was only after the apparatus had been kept for several days together, with the air compressed under considerable pressures, that a slight leak was sometimes manifested, in some of the joints; but they

were easily stopped, as soon as detected, either by tightening the screws, or by burnishing the parts of the metal around the leak.

Several determinations were made in succession, under the same pressures, leaving an interval of 10 minutes between them. The thermometers in the boiler varied very little during these intervals—rarely did the differences of their indications reach $\frac{1}{10}$th of a degree, and they always corresponded to variations in the pressure. Very often, a small quantity of the air was intentionally discharged from the reservoir, and after 10 minutes, a new determination of the boiling point was made, under a pressure only a few centimetres lighter. It was thus shewn, that the thermometers followed the variations of the pressure with great fidelity. Besides, an idea may be formed of the perfect regularity of the phenomenon, when the apparatus is in good condition, by the last four experiments of the table, which were made under a pressure of 28 atmospheres. These four determinations were obtained 10 minutes apart, so that the last one was 40 minutes after the first, and during this interval of time, the thermometers of the boiler varied only 0·05°, (0·09° F.,) corresponding to a decrease of 17 mm. (0·67 in.) in the manometer.

The pressure of 28 atmospheres was not the highest obtained with this apparatus. A series of experiments at 30 atmospheres was commenced, and the water had been, for more than half an hour, boiling under this enormous pressure, when an accidental blow cracked one of the manometer tubes, at the joint just above the roof of the building; and the boiler having been much strained, and one of the strengthening bands ruptured, it was judged most prudent not to proceed farther with this apparatus. M. Regnault, however, proceeds to describe minutely, another arrangement, by which the experiments might be carried much farther, and which he also proposed to apply to experiments upon the condensation of the gases.

(To be Continued.)

On Hydraulic Pressure Engines.

Read before the British Association for the Advancement of Science.

By Mr. J. Glyn.

Mr. Glyn read a paper, in which he called the attention of the members to a mode of employing the power of waterfalls in a most useful and important manner—too long neglected in this country, considering the advantages it affords in hilly districts, for the drainage of mines. He brought under their notice the means of employing high falls of water, to produce a reciprocating motion, by means of a "pressure engine."

The pressure engine acted by the power of a descending column of water, upon the piston of a cylinder, to give motion to pumps, for raising water to a different level, or to produce a reciprocating motion for other purposes. The pressure engine was calculated to give great mechanical effect, in cases where waterfalls may be found of much too great a height, and too small a quantity, to be practically brought

to bear in a sufficient degree on water wheels within the ordinary limits of diameter.

The author produced instances of the desired pressure engine, one of which was constructed about forty years ago, in Derbyshire—and which he believed was still at work in the Alport Mines, to which it was removed from its original situation. The cylinder was, he believed, 30 inches in diameter. In 1841, Mr. John Taylor advised the application of another and more powerful engine, at the Alport Mines, which was made under his (Mr. Glyn's) direction, at the Batterby Ironworks, in Derbyshire. This was the most powerful engine that had been made. The cylinder was 50 inches in diameter, and the stroke 10 feet. It was worked by a column of water of 132 feet in height, so that the proportion of power to act on it, was as the area of a piston to that of the plunger—namely, 1963 to 1385, or fully 70 per cent. The superintendent of the machinery assured him, that the engine had never cost them £12 a year since it was erected. Its usual speed was about 5 strokes per minute; but it was capable of working at 7 strokes per minute, without any concussion in the descending column, the duty actually done being equal to 163 horse power:—Area of plunge, 9·621 feet × 10 feet × 7 strokes = 673·41. $673{\cdot}41 \times 62{\cdot}5 \times 132 = \frac{5555632}{33000} = 163$ horse power.

The author concluded by remarking that, in this case, as in all others, when water acts by its gravity, or pressure, those machines do the best work, when the water enters the machine without shock, or impulse, and quits it without velocity. They thereby obtain all the available power that the water will yield with the least loss of effect; and this result is best accomplished, by making the pipes and passages of sufficient and ample size, to prevent acceleration of the hydrostatic column.

Lond. Athenæum, Aug. 1848.

On a New Element of Mechanism.

Read before the British Association for the Advancement of Science.

By Mr. R. Roberts.

The writer explained the construction of a contrivance, by which he effected, in a very simple manner, movements for which more complicated mechanism was frequently employed. The model consisted of a steel stock shaft, on which were fitted two brass disks, in such a way as to be kept steady. One of the disks had eleven teeth, rounded at the top and bottom, in its circumference, and was placed on the body of the shaft. The other disk, which was rather the larger, was in the eccentric position of the shaft, with its face to that of the toothed disk. The plain disk had four studs rivetted into it, at equal distances from each other, and at such distances as to admit of their being brought successively, by the revolution of the eccentric, to the bottom of the hollows in the toothed disk. The following movements may be effected by this model: viz., if the shaft be held stationary, and the disks be made to revolve upon it, one of the disks will make twelve revolutions whilst the other only makes eleven. Again, if the toothed disk be held

whilst the shaft be made to revolve twelve times, the plain disk will revolve, in the same direction, one revolution only; and if the plain disk be held, the toothed disk will perform one revolution, in the contrary, for eleven revolutions of the shaft. It would be evident that almost any other number of revolutions may be produced, by employing a smaller number of studs, not fewer than three, which will not divide the number of teeth in that disk. The idea of this novel element in mechanics, was suggested to Mr. Roberts by a dial movement in an American clock. Ibid.

Applications of Gutta Percha.

Read before the British Association for the Advancement of Science.
By Mr. F. Whishaw.

Mr. Whishaw read a paper, giving an explanation of the various applications of Gutta Percha; numerous specimens of which, in the shape of thread, cord, tubular staves, driving bands, constables' staves, sticks, whips, inkstands, medallions, shields, water buckets, stereotype plates, and almost every other description of article, both useful and ornamental, were present.

The paper, after stating that gutta percha was the concrete juice of a large tree of the same name, abounding in Borneo, &c., obtained by tapping the tree periodically, by the Malays, stated that its introduction into this country was purely accidental; Dr. Montgomery having transmitted the first sample of it to the Society of Arts, in 1843, at which time he (Mr. Whishaw) was Secretary to that Society. The first articles of use made of gutta percha, in this country, were laid before the Society of Arts in 1844, and consisted of a lathe-band, a short length of pipe, and a bottle-case, which he had himself made by hand, having caused the concrete substance to become sufficiently plastic, by immersing it in hot water. He also produced casts from medals, which attracted considerable attention at the time, and surgical instruments were soon after made of this new material. It was also adapted to commercial uses; and, from the period mentioned, to July 11th, in the present year, between 600 and 700 tons had been imported for the Gutta Percha Company. From 20 to 60 tons were now regularly imported every month.

Contrary to the general opinion, that gutta percha is a simple, hydrogenous substance, Mr. Crane (chemist to the Gutta Percha Company) found it, in its ordinary state, to consist of at least two distinct materials, besides a notable proportion of sulphur—viz., 1. A white matter, gutta percha in its pure state; 2. A substance of a dark brown color. Various experiments were made, to ascertain its strength when mixed with other matters, and also, as to what pigments would mix with it, without rendering it brittle, or deteriorating its qualities.—From these it appeared, that the only pigments that could altogether be relied on, to be used with gutta percha, were orange lead, rose pink, red lead, vermilion, Dutch pink, yellow ochre, and orange chrome.—Under the influence of heat and pressure, gutta percha would spread

to a certain extent, and more so if mixed with foreign matters. All the mixtures, composed of gutta percha and other substances, which had been subjected to experiment, except that containing plumbago, were found to increase its power of conducting heat; but in its pure state, gutta percha was an excellent non-conductor of electricity. The best composition for increasing the pliability of gutta percha, was that formed in conjunction with caoutchouc tar, and next in order, that of its own tar; and the best material at present known, for moulding and embodying, was obtained by mixing gutta percha with its own tar and lamp-black.

In describing the process of manufacturing gutta percha, the author observed, that rude blocks of the material were first cut into slices, by means of a cutting machine, formed of a circular iron plate, of about 5 feet in diameter, in which there are three radical slots, furnished with as many knives, or blades. The blocks are placed in an inclined shoot, so as to present one end to the operation of the cutters. The slices are then placed in a wooden tank, containing hot water, in which they are left to soak, until found in a plastic state. They are afterwards passed through a mincing cylinder, similar to that used in paper mills, for the conversion of rags into pulp, and then thoroughly cleansed in cold water tanks; the water, in cases of impure gutta percha, being mixed with a solution of common soda, or chloride of lime. It is next put into a masticating machine, such as is used in the manufacture of caoutchouc, and then pressed through rollers; thus being converted into sheets of various width and thickness. When necessary, the sheets are again masticated, and again passed through rollers. These sheets are subsequently cut into boards, by vertical knives, placed at the further end of the table, along which the sheets are carried, by a cloth or web, to another roller, round which they pass, and are cut into the required widths. The bands, or straps, are then removed, and coiled up ready for use. Driving bands for machinery are thus made, and shoe soles and heels are stamped out of similar sheets of gutta percha.

In making tubes, or pipes, either of gutta percha, or any of its compounds, a mass of gutta percha, after being thoroughly masticated, is placed in a metal cylinder, furnished with a similar piston, by which it is pressed down into an air box, kept hot with steam, which has at its lower end a number of perforations, through which the plastic material is forced into a cup, whence it passes out, round a core, into the desired tubular form, and thence through a gauge to the required size, and into a receiver of cold water, being drawn to the other end of a long trough, by a cord passing round a pulley at the far end of the trough, and returning to the person in attendance on the machine, who gradually draws the pipe away from the air machine. Thus tubes of considerable length and diameter are made to a very great extent, and are used for the conveyance of water and other liquids, and are now under test for the conveyance of gas.

The paper next explained the variety of articles already made of gutta percha, which were of three classes:—1. Useful; 2. Ornamental; and 3. Useful and Ornamental combined. Various articles were then

exhibited, including two very handsome shields and a splendid communion dish and service.

Mr. Whishaw next exhibited the Telakouphanon, or Speaking Trumpet; and in doing so, said that speaking tubes of gutta percha were quite new, as was also the means of calling the attention, by them, of the person at a distance, which was accomplished by the insertion of a whistle, which, being blown, sounded at the other end quite shrilly. Attention having been thus obtained, you remove the whistle, and, by simply whispering, the voice would be conveyed quite audibly, for a distance of at least three quarters of a mile, and a conversation kept. It must be obvious how useful these telegraphs must become in large manufactories; and, indeed, in private houses they might quite supersede the use of bells, as they were so very cheap, and by branch pipes, could be conveyed to different rooms:—and, indeed, if there were no electric telegraphs, they might, by a person being stationed at the end of each tube of three quarters of a mile, or a mile, be made most speedily to convey intelligence for any distance. In private houses the whistle need not be used, but a more musical sound could be produced. He then amused the auditors, by causing the end of the tube, which was of the length of 100 feet, to be inserted into the mouth-piece of a flute held in a person's hand, regulated the notes, and placing his own mouth to the other end of the tube, "God save the Queen" was played at a distance of 100 feet from the person giving the flute breath. Turning to the Bishop of St. David's, he said that, in the event of a clergyman having three livings, he might, by the aid of three of these tubes, preach the same sermon in three different churches at the same time.

Mr. Whishaw also exhibited the gutta percha submarine rope, or telegraph; which consisted of a tube, perforated with a series of small tubes, for the conveyance of telegraphic wire, and which, for the purpose of preventing its being acted upon by sea water, or marine insects, was banded or braided round by a small rope; and its being perfectly air-tight would render it quite impervious to the atmosphere. Ibid.

Improved Hydraulic Valve.

This valve, proposed for hydraulic purposes, is a modification of the bucket valve, with this difference, that the bottom seat is increased to a sufficient area for a water way, and thus considerably lessens the lift of the valve, and ensures a steady action. It will be found to shut without rebounding, and consequently prevents the loss of water, the shock, and the wear and tear, which are found to attend most of the valves now at work, from having too much area exposed to the action of the water. The valves, again, being too light in proportion to their area, do not shut until the pole returns some inches. These disadvantages will, I have no doubt, be avoided by the application of the improved valve, represented in figs. 2, 3, 4, and 5, plate V.

JOHN POOLE, Jr.,

Copper House Foundry, Hayle, Cornwall.

Lond. Mec. Mag., June, 1848.

Gas Purifier. ALFRED HENRY STILL, *of the Gas Light and Coke Company's Works, Shoreditch, Proprietor.*

Fig. 6, plate V., is a longitudinal section of this purifier. A A is a cylindrical case, and B is a shaft, which runs the whole length of the cylinder, A; it has its bearings in stuffing-boxes, which are placed around it, where it passes through the ends, C C, of the cylinder, and also in the upright bars, D D D. E E E, are a set of wooden rollers affixed on the shaft, B; they are studded with strips of whalebone, or other flexible material, throughout their whole length. A cross section of one of them is given in fig. 7. The cylinder, A, is filled to the height of the line *a b* with water, or a mixture of lime and water, or any other suitable liquid, or solution; the shaft, B, is made to rotate, by means of a band from some prime moving power, passed over the pulley, F. The gas to be purified is then allowed to escape through the pipe, G, and after passing through the machine, it escapes by the pipe, H. When a fresh supply of water, or lime and water, is required, the previous, or exhausted, charge is allowed to flow into the vessel, I, by means of the valve, K, from which vessel it can be subsequently removed through the door, L. The fresh material is supplied to the cylinder through the pipe, L. Ibid.

The Safety Lamp.

At a recent meeting of the Geological and Polytechnic Society of Yorkshire, the Rev. W. Thorp read a paper "On a New Safety Lamp, affording three times as much light as the Davy lamp, and quite as safe in the fire-damps of coal mines." The chief defect of the existing lamps was an insufficiency of light, which induced the workmen to withdraw the protecting wire gauze, or substitute a naked candle. In order to obtain more light, the Rev. W. Thorp introduces, with considerable ingenuity, the argand, or rather the solar burner, characterized by the circular wick, and the air admitted through its centre from the bottom of the lamp, protected, of course, by gauzes of wire. Connected with this part of the lamp, is an adjustment, placed outside of the cistern, by which the wick can, with the greatest ease, be raised or lowered. Over the light is applied a chimney of iron, based with a few inches of glass, with air admitted to supply the exterior of the flame, from the inside of the lamp. This is so securely fixed, that it cannot be displaced or broken, from the ordinary falls, or minor casualties, to which these lamps are liable to be exposed.

Having obtained the great desideratum—a much higher illuminating power, or more than five times the quantity of light the Davy lamp affords, or that equal to two mould candles generally used by miners; the next object being to insure perfect safety in every condition of the mine, there are inserted into the chimney four or five chambers of wire gauze, so that the flame of ignited gas has to traverse eight or ten meshes, before it can possibly reach the exterior fire-damp; but as one

mesh, as in the old lamp, is perfectly safe, unless exposed to a current, and as no lateral current of gas, or air, can be exerted upon the flame, on account of the chimney, the lamp is perfectly safe. And it is found, by any artificial means, utterly impossible to pass flame through these chambers of gauze, so that it appears to be quite safe under every circumstance and condition of the mine.

There are other advantages over the Davy lamp of no considerable value:—1. It requires trimming only once a week. 2. The oil does not fall out if laid on one side. 3. It is much more easily cleaned.—4. The cheapest oil can be used in it. The price of the lamp will be only 3s. or 4s. more (perhaps less) than the Davy lamp; and the latter can, at a small expense, (5s.,) be converted into the new lamp. A cast metal instead of a brass cistern can be made, by which the new lamp can be sold for even a less price than the Davy lamp.

London Artizan, March, 1848.

New Process for Engraving on Silver, or on Silvered or Gilded Copper. By M. Poitevin.

Some months since we published an ingenious method, discovered by M. Niépce de Saint Victor, of counter-drawing designs and engravings upon paper, glass, or metal plates. M. Poitevin has succeeded in producing plates, engraved either in relief, or in sunk lines, from which proofs may be taken. For the carrying out of this process, from two to three hours only are required.

The engraving is first exposed to the vapor of iodine, which becomes deposited upon the black parts only. The iodized engraving is then applied, with slight pressure, to a plate of silver, or silvered copper, polished in the same manner as daguerreotype plates. The black parts of the engraving, which have taken up the iodine, part with it to the silver, which is converted into an iodide at those parts opposite to the black parts of the design. The plate is then put in communication with the negative pole of a small battery, and immersed in a saturated solution of sulphate of copper, connected with the positive pole by means of a rod of platinum. The copper will only be deposited on the non-iodized parts, corresponding to the white parts of the engraving, of which a perfect representation will thus be obtained;—the copper representing the white parts, and the iodized silver the black parts. The plate must be allowed to remain in the bath for a very short time only; for, if left too long, the whole plate would become covered with copper. The plate, after having received the deposit of copper, must be carefully washed, and afterwards immersed in a solution of hyposulphite of soda, to dissolve the iodide of silver, which represents the black parts; it is then well washed in distilled water, and dried. The next operation is, to heat a plate to a temperature sufficient to oxidize the surface of the copper, which successively assumes different tints, the heating being stopped when a dark brown color is obtained. It is then allowed to cool, and the exposed silver is amalgamated,—the plate being slightly heated, to facilitate the operation. As the mercury

Plan of Seating.

Fig. 2.

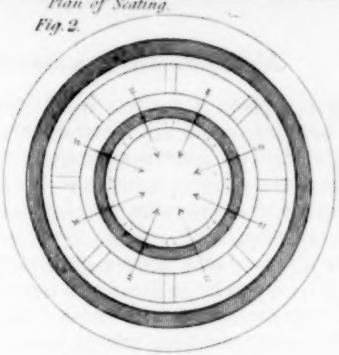
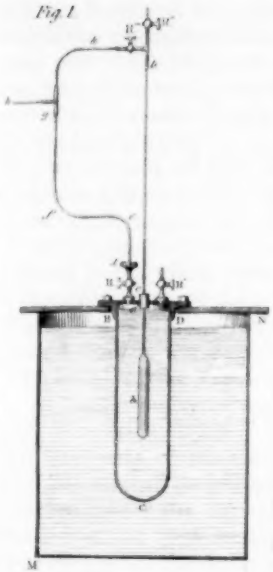
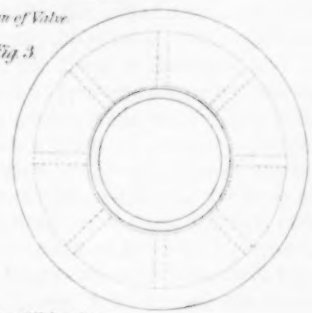


Fig. 1



Plan of Valve.

Fig. 3.



Section of Valve shut.

Fig. 4.

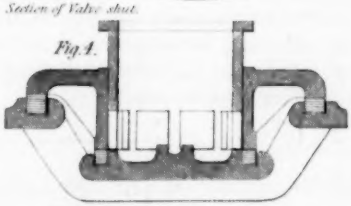


Fig. 7.

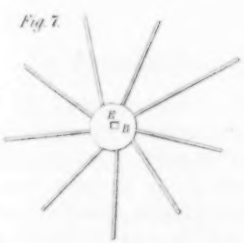
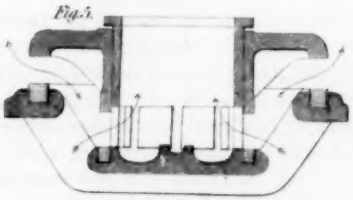
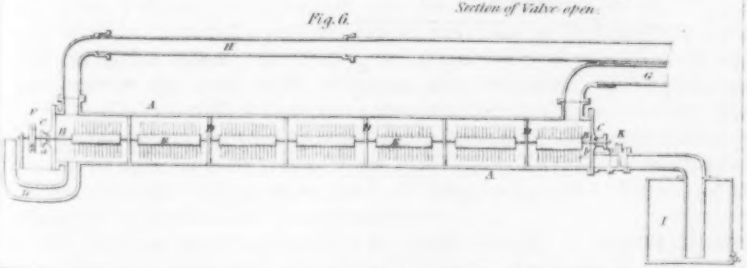


Fig. 5.



Section of Valve open.

Fig. 6.



will not combine with the oxide of copper, a design is produced, of which the amalgamated parts represent the black, and the parts of the plate covered with oxide of copper, represent the white parts. The amalgamation being completed, the plate is to be covered with three or four thicknesses of gold leaf; and the mercury is evaporated by heat, the gold only adhering to the black parts. The superfluous gold must then be cleaned off with the scratch-brush; after which, the oxide of copper is dissolved by a solution of nitrate of silver, and the silver and copper underneath are attacked with dilute nitric acid. Those parts of the design which are protected by the gold, not being attacked, correspond to the black parts of the plate; the other parts corresponding to the white parts of the engraving, may be sunk to any required depth. When this operation is completed, the plate is finished, and may be printed from in the ordinary method of printing from wood-cuts.

To obtain, from the same prints, plates with sunk lines, similar to the ordinary engraved copper plates, a plate of copper, covered with gold, is operated upon. On immersion in the sulphate of copper solution, the parts corresponding to the white parts will become covered with copper. The iodine, or compound of iodine, formed, is then to be removed by the hyposulphite, the layer of deposited copper is oxidized, and the gold amalgamated, which may be removed by means of nitric acid,—the oxide of copper being dissolved at the same time. In this instance, the original surface of the plate corresponds to the white parts of the print, and the sunk or engraved parts to the black parts, as in the ordinary copper-plate engravings.—*Bulletin de la Société d'Encouragement.* **Lond. Journ. Arts, Sept. 1848.**

On Pseudoquina, a New Alkaloid. By M. MENGARDUQUE.

M. Pelouze had in his laboratory an extract of cinchona, the source of which was uncertain; he gave it to the author for examination as an exercise. This substance was of a deep brown color, friable, very bitter, slightly soluble in water, soluble in acids, which it saturated like the alkaloids, and formed true saline solutions, from which water precipitated it as a pitchy mass. This matter, treated by the processes for the extraction of quina and cinchonia, did not yield the least trace of either of these alkaloids; nor was the cinchovatine of M. Manzine met with in it; but the author was so fortunate as to discover an alkaloid which he believes to be new, and which he so described, as to leave no doubt in the mind of M. Pelouze, who witnessed his experiments.

This alkaloid differs from the substances by which it is accompanied in the extract, in saturating acids more perfectly, insomuch that it expels ammonia from its compounds, like lime or barytes; it scarcely dissolves, even in boiling ether, and of these properties advantage was taken, in order to effect its separation.

The extract was boiled with an equal weight of hydrochlorate of ammonia, till ammonia ceased to be evolved. On cooling, a very abundant brown matter was deposited, of a syrupy consistence, upon which

floated a limpid liquid, of a light amber color. This liquor, poured off and filtered, was precipitated by ammonia.

The product thus obtained was yellowish and flocculent, susceptible of softening, and agglutinating by heat. It was dried and treated with cold ether, which dissolved the greater part of it, and left a pulverulent white matter, which was the new alkaloid in a state of purity

This product, thus purified, possessed the following characters: subjected to heat, on platina foil, it fuses, and then burns with a blue flame, without leaving any residue. It is insoluble in water, and insipid, soluble in alcohol, and much more so when hot than cold; its alcoholic solution readily crystallizes in irregular prisms; it is soluble in the mineral, and in organic acids, even diluted; it is insoluble in ether.

Ammonia, potash, and soda, precipitate it from its saline solutions; water precipitates it from solution in alcohol. Lastly, if it be dissolved in aqueous solution of chlorine, and ammonia be added, the liquor assumes a reddish-yellow color. It is well known that quina, similarly treated, yields a green solution.

Its solution in sulphuric acid may be rendered neutral to litmus paper; it is but slightly bitter. By evaporation, it yields fine crystals, which are flattened prisms beveled at the summits.

The solution in hydrochloric acid had all the properties of an hydrochlorate, but it could not be made to crystallize.

By analysis it yielded—

	I.	II.
Carbon,	76·5	76·7
Hydrogen,	8·1	8·2
Nitrogen,	10·2	10·4
Oxygen,	5·2	4·7
	100·0	100·0

The author concludes, from the chemical and physical properties of this substance, and especially from its composition, that it is a new alkaloid.—*Comptes Rendus*, Août, 1848.

Lond. Edin. & Dub. Phil. Mag., Oct. 1848.

Preparation of Meta-Antimoniate of Potash as a Test for Soda.

M. Fremy observes that, since the publication of his first memoir on the antimoniates, the meta-antimoniate of potash has been generally employed in laboratories as a test of the salts of soda; and as the preparation of this salt has been found difficult by several chemists, the author states the following to be the process which he now employs, and by which he obtains in a few hours nearly two pounds of meta-antimoniate of potash.

He begins by acting upon one part of antimony with four parts of nitre, in a red-hot earthen crucible; insoluble anhydrous antimoniate of potash is formed, which is washed with cold water, to remove the nitrite and nitrate of potash, an excess of which it usually retains.

The antimoniate of potash is then boiled for two or three hours in water, in order to convert it into the gummy soluble antimoniate; water is to be added to supply the loss by evaporation. During ebullition, the greater part of the antimoniate dissolves, there remaining but a small quantity of bi-antimoniate of potash, which is separated by the filter.

The solution of the gummy antimoniate of potash is then evaporated, adding to it several fragments of pure hydrate of potash, so as to render it very caustic. A few drops of the solution are tried from time to time, to see whether, on cooling, they become crystalline; and when this takes place, the evaporation is to be discontinued, the meta-antimoniate of potash then crystallizing abundantly; the alkaline solution is to be poured off, and the salt is to be dried on porcelain plates.

This salt always contains an excess of alkali; it ought to be washed two or three times before it is used as a reagent. As the meta-antimoniate of potash decomposes in solution in water, it is proper to keep it in the dry state, and to dissolve it at the moment in which the trial is to be made.

To make an examination, which scarcely requires ten minutes, about fifteen grains of the potash to be tried, should be dissolved in a small quantity of water, and supersaturated with hydrochloric acid, and the solution is to be evaporated to dryness, in a porcelain or platina capsule. The chloride of potassium, being then perfectly neutral, is redissolved in water, and treated with the solution of meta-antimoniate of potash. If the potash contains 2 or 3 per cent. of soda, a precipitate is almost instantly formed; but if the quantity be smaller, time and agitation will be necessary to effect precipitation.

M. Fremy states the sensibility of this reagent to be so great, that he found, by synthetic experiments, he could detect a half per cent. of carbonate of soda in commercial potash.—*Ann. de Ch. et de Phys.*, Août, 1848. Ibid.

Copper Smelting at the Royal Saxon Works, at Freyberg.

As this important subject has so fully occupied your columns, the following observations, communicated to me by Prof. Kerstens, the principal comptroller of the Royal Saxon Works, at Freyberg, may be not unacceptable to your readers. The furnaces used here, are an improvement on the blast system pursued in the Hanoverian and Prussian Government works. He says, they smelt about 700 German quintals of ore, which give about 200 quintals of coarse metal, containing about 70 quintals of copper. The calcining of the coarse metal will produce 150 quintals of calcined metal, and by again melting and refining, will be obtained 60 quintals of pure copper—this being the produce of 700 quintals of copper ore in one of our furnaces per week; I have calculated 10 per cent. loss of copper as results at Freyberg.—The constant operation of one furnace, properly constructed, and costing about £60, lasts three or four months without interruption. Coke is the only fuel used, and considered the most advantageous. On an

average of five years' smelting, 100 quintals of ore, through all the processes, consume 4 cubic metres of coke—1 cubic metre of coke is equal to $2\frac{845}{1000}$ cubic metres of charcoal. By using coke as fuel, they always obtain a greater produce of metal than by charcoal, or pitcoal. The Freyberg coal gives 68 per cent. of coke. The cubic metre is reckoned to contain 61,023·50 cubic inches, which, reckoning 1728 cubic inches to a cubic foot, will make the metre equal to 35·31 cubic feet. The cubic foot of coke weighs about 24 lbs. In the first reduction, it is reckoned that 1·492 cubic feet are required to smelt 1 cwt. of copper, and that it would take 29·84 cubic feet of coke to smelt an English ton, which is equal to $13\frac{92}{100}$ cwts. of pitcoal. C.

London, Sept. 12, 1848. Lond. Min. Journ., No. 682.

The Coloring Property of Madder.

Dr. Edward Schunck presented to the Chemical Section of the British Association, his third report on the coloring property of madder. The extractive matter of madder-root contains seven different substances, only one of which, however,—the alizarine—is of value for its color; all the others, indeed, tend to impair the color yielded by alizarine; and the chief use in adding lime to madder in dyeing is, that it combines with the other substances, and renders them harmless.—Potass, or other alkalies, would have a similar effect; but as lime is cheaper, there would be no advantage gained in substituting alkalies. It was suggested that a practical application might be made of the analysis, by extracting the alizarine in a separate state, freed from the injurious adjuncts, in which condition, it was hoped, a better and more durable pigment might be obtained, especially in the madder lakes. The experiments have, however, been so recently made, that no practical results can as yet be expected.

Civ. Eng. & Arch. Journ., Sept. 1848.

Coal and Iron.

Mr. Booker, being called on by the President for some statistical information, stated that there were 159 blast furnaces in the district employed in smelting iron, and that 550,000 tons of iron were annually manufactured. The coal raised in the district was employed as follows:

1,500,000 tons annually in the manufacture of iron.
200,000 " " " " copper.
150,000 " " " " tin.
750,000 " employed in domestic purposes and in agriculture.
1,750,000 " exported.

4,350,000 tons per annum.

At this rate, and supposing the coal to exist only over 100 square miles, there was sufficient for 1400 years to come. The value of the exports from the district, consisting of iron, &c., in a state of rough manufacture, amounted to £4,000,000 a year.—*Trans. Br. Assoc. for the Adv. of Sci.* Lond. Athen., Aug. 1848.

FRANKLIN INSTITUTE.

Committee on Exhibitions.

Report of the Eighteenth Exhibition of American Manufactures, held in the city of Philadelphia, from the 17th to the 28th of October, inclusive, 1848, by the Franklin Institute of the State of Pennsylvania, for the Promotion of the Mechanic Arts.

The Committee on Exhibitions of the Franklin Institute, respectfully present the following report of their Eighteenth Exhibition of American Manufactures which is now about closing.

They congratulate themselves and all who take an interest in the success of our manufactures, upon the renewed evidence which this Exhibition has afforded of the rapid improvement of our arts and our power to maintain ourselves, independent of all foreign nations for the supply of our wants and luxuries. It is not necessary to assert the advantageous influence which these exhibitions exert in promoting the growth of our domestic manufactures. Their rapid spread among our neighboring cities, and their extension to the west among communities which are destined in their turn to vie with us in wealth and importance, prove their importance, and render it a useless task to undertake their defence. But there is one point to which we may be perhaps permitted to call your attention—that is, to the immense and beneficial influence which they have exerted in promoting among our people the taste for American goods. Not many years have passed since the fashion of the country required to be gratified with imported goods, and the products of our own manufactories were frequently sold as foreign. At present, this fashion, if not entirely eradicated, is at least greatly checked. The public taste has been directed in a more honorable course. We begin to have a pride in making use of our own materials, fashioned by our own industry, and the use of fraudulent labels becomes every year more and more difficult, when the public may see the articles in our Exhibitions and satisfy themselves as to their origin. The practice, it is believed, however, is not yet entirely done away with, and we confidently appeal to you, the manufacturers and mechanics of the country, to assist us in our endeavor to put an entire stop to a practice, which in more than one point of view is a deep disgrace to us as a people.

The number of articles deposited with us for exhibition this year is unusually large; but the Committee regret that a large portion of them were brought in at so late a period as to prevent them from being, under the regulations, presented to the judges for their opinion. The experience of the Committee has shown how necessary their regulations upon this subject are, and they are entirely convinced of the importance of adhering rigidly to them. The small number of goods which arrived too late for the judges, at the Exhibition for 1847, had taught them to hope that the depositors themselves were convinced of the correctness

of their policy, and they regret to see a relapse upon this point, which, however, they hope they will not again have occasion to advert to.

The articles submitted for competition have been referred for their examination to judges who were carefully selected for their knowledge in the particular departments of the arts, and for their impartiality, and upon their judgments expressed in writing, the Committee have founded their awards of premiums.

It is perhaps impossible among so many and such various articles, to prevent oversights and errors, by which a meritorious individual may be deprived of his due reward; still more so, to give to each the full share of praise, which he naturally supposes is due to his exertions. All that the Committee can claim is, to have done every thing in their power to avoid such accidents; to have fulfiled the duties which have devolved upon them with earnest zeal and impartiality; and to hold themselves ready to investigate, and as far as lies in their power, to repair any injury which may have inadvertently been inflicted upon any one. On these points they feel assured that the depositors and the public will do them the justice which they deserve.

Our present exhibition, although a large one, and as remarkable for the quality as for the number of the articles exhibited, is, we cannot deny, a very uneven one. Certain departments, which have heretofore contributed much to its value and interest, being now either almost entirely wanting, or very deficient in interest, while others have assumed an importance which they have never before indicated; and some which have been considered in former exhibitions as perfect as could be expected or imagined, now show well marked improvement. Into the reason of this it is not our province at present to inquire, but we hope that it will be rectified in future by the deficient branches coming up to the highest standard.

The following is a summary of the reports of the judges in which it is believed, no article has been omitted which was favorably noticed by them:

I.—*Cotton Goods.*

The judges regret to observe that the specimens of cotton manufactures furnished for the annual exhibition, seem to decrease in variety and style every year.

They recommend, and the committee have awarded the following premiums.

No. 38. Bird eye diaper and crash, made by Henry H. Stevens & Co., Webster, Mass., and deposited by Hacker, Lea & Co.,

A First Premium.

These we believe to be the first linens made by power loom in the United States, and the judges are pleased to see the beginning of what may at no very future day become a very important branch of manufactures.

No. 612. Ginghams, made and deposited by William Smith, of Philadelphia. They are superior to any which the judges have ever seen. *A First Premium.*

No. 20. Ginghams made by Ida Mills, Troy, N. Y., and deposited by John W. Downing, *A Third Premium.*

No. 41. Cotton flannels, made and deposited by Garsed & Brothers, Frankford, Pa., *A Third Premium.*

The following articles are favorably noticed.

No. 19. Bleached muslins, from the Ida Mills, Troy, N. Y. These goods, it is believed, have received premiums on several former occasions, but as they do not excel either in quality or style what has been heretofore furnished by the same concern, the judges do not consider them as entitled to any thing more than a favorable notice.

Nos. 25 to 29. Silesias and bleached cottons, from the Lonsdale company, Providence, R. Island. The specimens fully sustain the good reputation which the fabrics produced by this company have long enjoyed, but the judges see no improvement either in the style or finish.

The steam purple and chintz furnitures, from the Messrs. Chapin, Fall River, Mass., show an improvement in this class of work.

No. 53. Brown sheetings, from Penn Mills, Pittsburgh, Pa., are very fair specimens of sheetings, and while they do not excel those exhibited last year, are worthy of notice.

Nos. 57 to 60. Specimens of bleaching from Goodall & Co., Philadelphia, fully sustain their former reputation.

No. 4. Two cases of bleached cotton shirtings, bleached and deposited by John Shepherd, South Trenton, New Jersey. Very well finished for coarse goods.

No. 6. Patent seam duck, made by Jas. Maull, Baltimore, Md., deposited by Jas. Maull, Jr., Philadelphia. The patent seam consists of an increased quantity of chain for the space of an inch or a little more, in the centre of cotton duck of the usual width used for sails, and is intended to supersede bited sails. The improvement is novel, and adds much to the beauty of a sail, but being very recently introduced, its value cannot yet be attested to.

II.—*Woolen Goods.*

The judges notice with regret that the display of woolens is far inferior both in quantity and quality to former exhibitions.

They make the following awards.

To No. 3. Black satinett, made by Camp & Morris, Woodbury, Conn., deposited by D. B. Hinman & Co., a very superior article, *A First Premium.*

No. 74. Green and scarlet blanket coating, made by the New England Worsted Comp., deposited by Pease & Foster—splendid goods, *A First Premium.*

No. 84. Fancy woolen shawls, made by the Waterloo Comp., Waterloo, N. Y., and deposited by Tredick, Stokes & Co., *A First Premium.*

No. 33. A shawl, made by Duncan & Cunningham, and embroidered by Miss Bigler, of New Jersey. For the beauty of design and superb workmanship, *A First Premium.*

No. 43. A lot of fancy zephyr goods, made and deposited by J.

Hoffman, Mantua Village, Pa., a new branch of industry and worthy of encouragement. The specimens, beside being splendid in quality, show evidences of great skill in manufacture, *A First Premium.*

No. 40. Wool black cloths, made by W. & D. D. Farnham, Waterford, Conn., deposited by Ellison & Peters, a very superior article, and worthy of all commendation. A first premium was awarded last year to duplicates of the above.

No. 83. Piece-dyed black cloths, made by the Utica Globe Mills Company, Utica, N. York, deposited by Tredick, Stokes & Co. These goods, though ordinary in quality, are entitled for their superior taste and finish to a *A Third Premium.*

The judges also mention with approbation,

No. 78. Fancy cassimeres, made by the New England Company, Rockville, Conn., deposited by Tredick, Stokes & Co.

No. 8. Black cassimeres, made by the Seneca Woolen Mills, N. Y., deposited by Dulles & Aertsen.

No. 75 & 76. Brown mixed blanket coatings, made by the New England Worsted Company, deposited by Pease and Foster.

No. 17. Cotton blankets, made and deposited by Wm. Curry, Philadelphia. A new article.

No. 46. Plaid cloakings, cotton and wool, made by P. & D. Hickey, Philadelphia, deposited by C. H. Welling.

No. 51. Cotton pantaloon stuffs, made and deposited by J. C. Kempton, Manayunk, Pa.

No. 10. Worsted drawers, made and deposited by Wm. Brown, Philadelphia, a new and creditable article.

No. 70. Merino shirts and drawers, made by the New Britain Company, Concord, Mass., and deposited by Williams & Co.

No. 30. Woolen hosiery, made by J. Beck, Berks Co., Pa., deposited by A. Durell.

III.—*Carpets.*

The judges on carpets regret that with the known improvements that have been made in the manufacture of carpets within the past year, so few specimens have been sent for exhibition. Of those exhibited they consider

No. 412. Tapestry, Damask Venetian, manufactured by A. M'Callum & Co., and

No. 376. Four rolls Brussels, manufactured by J. Rosencrantz, Philadelphia, entitled to *First Premiums.*

The former is a new style of Venitian carpets, that has been but recently attempted to be manufactured in this country, and in colors, quality and style will compare very favorably with the best English of the same kind. The latter is a decided improvement upon last year's specimens, and in quality, is equal to the best English Brussels, and being a new article of but limited manufacture in this country, is well worthy of the favorable notice of the Institute.

No. 304. Table and piano covers, made by G. D. H. Mensing, Philadelphia, deposited by Henry & Thomas, are very handsome styles

and durable quality, resembling the French article of the same kind. As table covers of this description are so rarely manufactured in this country, they think these worthy of *A Second Premium.*

No. 373. Stair oil cloth, made and deposited by Isaac Macauley, Trenton, N. J. In these lots they mark some improvement upon last year's specimens, in their finish and appearance.

IV. *Silk Goods.*

The judges recommend the following awards:

No. 1. Embroidered capes, handkerchiefs, dresses, &c., manufactured by John Egan, Philadelphia. This is an entirely new branch of manufacture, and worthy of the particular notice of the Institute. The articles exhibited will compare very favorably, both in quality and price, with imported goods of the same description. The committee, in accordance with the report of the judges, recommend to the Institute, to award a gold medal. Mention should also be made of Mr. King, the designer of the patterns. These are believed to be the first goods of this description made in this country.

No. 37. Five pounds, 10 bundles, blue sewings, made by Colt & Co., deposited by Hacker, Lea & Co. This is a very good article and worthy of *A Second Premium.*

No. 64. Colored sewings, made and deposited by J. E. & T. S. Hovey, Mansfield, Ct. The judges consider this the best article of colored sewings exhibited, and for beauty of finish and brilliancy of color equal to the Italian. *A First Premium.*

No. 72. Cases of silk fringes and buttons, made and deposited by Hastings & Dewey, Philadelphia. The judges have carefully examined these fringes, and take pleasure in directing the attention of the Institute to them. They are superior to the imported article, and are thoroughly American. Designed by Messrs. H. & D., the silk dyed and finished in this country. *A First Premium.*

No. 101. One case sewing silk, made by Cheney & Bro., Manchester, Connecticut, deposited by Todhunter & Sill. The black sewings, the judges consider the best specimen in the exhibition, quite equal to the most of the Italian imported and worthy of *A First Premium.*

The sample of colored sewings, the judges do not consider equal to that of No. 64. *A Second Premium.*

The judges notice favorably

No. 33. Silk and wool vesting, made and deposited by Jas. Campbell, Delaware Co., Pa.

No. 68. Spool silk, made by John Kyle, Paterson, N. J., deposited by W. H. Horstmann & Sons, a good article, and worthy of notice for the manner in which it is put up.

V. *Iron and Steel.*

The judges remark that this branch is represented in the present Exhibition, in a manner creditable to the great Iron interests of our country. They award the following premiums:

No. 1661. Two sheets Boiler Iron from the Thorndale Iron Works,

Chester county, Pa., J. & J. Forsyth & Son, deposited by Morris & Jones & Co. They are of unusual size—46 inches wide by about 14 feet long. Also two circular plates for boiler ends, about 55 inches in diameter, by 5-8 thick. These they consider superior specimens, the two first being the widest sheets of boiler iron ever exhibited. *A First Premium.*

No. 1693. Three bars rail road Iron made and deposited by Reeves, Buck & Co., Philadelphia. Also cuttings from the ends of the rails to show the quality of the iron. For the general excellence of the specimens, *A First Premium.*

No. 1655. A large lot of rolled Iron by Moore & Hooven, Norristown, Pa., deposited by Morris & Jones & Co., are believed to be fully equal to the specimens exhibited in 1847, for which they were awarded *A First Premium.*

No. 1663. A lot of boiler rivets by the Dover Works, N. J., deposited by Morris & Jones & Co., well made and superior to any heretofore deposited, *A Third Premium.*

No. 1586. Two patterns of double rail road Iron, by A. B. Seymour, Bordentown, N. J. *Referred to Committee on Science and Arts.*

The judges speak in favorable terms of

No. 1518. Verandah Iron, by Heins & Adamson, Philadelphia.

No. 1558. A lot of wire railing and cylinder coal screen, by Wickersham & Hamlin, Philadelphia.

No. 1637. A Muley Mill Saw, by W. & H. Rowland, Philadelphia.

No. 1644-45. Lot of butt welded Iron tubes, by Morris, Tasker & Morris, Philadelphia. The judges express a hope that since these gentlemen have succeeded so well in this branch of manufacture, they will turn their attention to the lap welded tubes, and thus render us independent of a foreign supply.

No. 1646. A lot of valve stop-cocks, by the same.

No. 1647. Two coils of Iron tube, from the same.

No. 1652. A casting for a grate front, from the same.

No. 1653. A lot of small cast iron water pipes, from the same.

No. 1638. A lot of blistered steel, by W. & H. Rowland, Philadelphia. The judges have had no opportunity of judging of its quality. Also a bundle of spring steel, from the same.

No. 1640. A lot of wire work, from Watson & Cox, Philadelphia.

No. 1658. Scroll Iron from the Kensington Iron Works.

No. 1659. Boiler Iron from the Pottsville Iron Works, Montgomery county, Pa., H. Potts & Co., deposited by Morris & Jones & Co.

No. 1660. Boiler Iron from the Triadelphia Iron Works, Chester county, Pa., J. Yearsley & Bro., deposited by the same.

No. 1664. Sheet Iron, by McCollough & Co., Delaware, deposited by the same.

No. 1677. An Iron bedstead, by Heins & Adamson, Phila.

No. 1688. Hammered Iron, by D. Schall, Berks county, Pa. deposited by W. F. Potts, Philadelphia.

The judges would suggest the propriety of giving notice to depositors of Iron and Steel, to furnish samples of the kind they intend to deposit some time previous to the Exhibition, to allow time to submit them to the proper tests.

They would also renew their commendation of Messrs. Morris & Jones & Co., for their unwearied exertions to promote the objects of the Institution.

VI.—*Umbrellas.*

There is but a single lot deposited in time for the inspection of the judges.

No. 9. 1 Case of Pearl Mountings for Parasols, Umbrellas and Knives, made and deposited by S. H. Lowber, Philadelphia.

The articles are in good taste, and exhibit a skill in manufacture equal to that shown by any imported articles.

The judges recommend the award of *A Third Premium.*

VII. *Lamps and Gas Fixtures.*

The judges report that they have examined the articles exhibited in this department, with much care, and are of opinion that they afford evidence of continued progress in improvement.

They recommend as follows:

No. 1274. Lamps and Gas Fixtures by Cornelius & Co., Philadelphia. They would call attention to the beautiful chandeliers, in which much good taste is combined, with equal skill in the arrangement and finish of the profusion of ornamental work with which they are covered. An award of a gold medal was given to these gentlemen by the Institute last year for chandeliers in no respect superior to those now exhibited. Had it not been given on that occasion, it would certainly be due to them on this.

No. 1336. Lamps, Chandeliers, &c., by Archer & Warner, Philadelphia. This array is highly creditable to the skill of the Manufacturers. Some of their silvered and damask artic'es are especially well finished. Their parlour gas pendants are also highly creditable. The judges deem these and their bracket lights of novel and spirited design, deserving *A First Premium.*

VIII.—*Hardware and Cutlery.*

The display under the notice of the judges is by no means as extensive as heretofore, although it is highly creditable to the different manufacturers. The judges can safely say, that much more care has been paid to the finish of the goods, together with many improvements in articles, which will prove beneficial to all parties concerned.

There have been very few, if any articles in this line submitted to your judges which do not reflect credit upon their makers, and sustain a laudable reputation.

They are as follows:

No. 604. Door spring, made and deposited by J. B. Wells, New York. *A Third Premium.*

No. 606. A lock, by F. C. Goffin, Trenton, N. J., of very ingenious construction. *Referred to Committee on Science and Arts.*

No. 609. Emery paper made and deposited by Robt. Boyd, N. Providence, Delaware Co., Pa. The best article of its kind. *A Third Premium.*

No. 610. Horse shoes, made and deposited by W. M. Leach, Philadelphia. They are truly beautifully finished articles, equal to any thing of the kind ever exhibited. *A Third Premium.*

No. 613. Stencils by S. H. Quint, Philadelphia. *A Third Premium.*

No. 617. Guns and pistols, by John Krider, Philadelphia. These articles are of very good finish, equal to any thing of the kind made in this country or any other. The pistols in particular are a master piece of work. *A First Premium.*

No. 621. Adjustible metallic throat piece for planes, by B. F. Schelabarger, Mifflintown, Juniata Co., Pa.

Referred to the Committee on Science and Arts.

No. 624. A lot of saws, by Hoe & Co., New York, deposited by Edward Frith. A very handsome display of goods, particularly the circular saw, which is finished in very superior manner, and appears to be very true. *A First Premium.*

No. 648. Cast iron molasses gates, made by Benedick & Ball, Chicopee, Mass., deposited by Steinmetz & Justice. They are good articles, well finished, and answer an excellent purpose. *A Third Premium.*

No. 637. Stocks, dies, and taps, made and deposited by B. Martens, Philadelphia, equal in all respects to previous specimens which obtained the first premium.

No. 639. Brass work, &c., made and deposited by J. and H. Jones, Philadelphia, sustains the reputation of the makers. They are of beautiful finish, and for the display the makers are entitled to *A First Premium.*

No. 644. Castings, by Savery & Co., Philadelphia, as good as ever made. For their enameled ware of various kinds, Messrs. S. & Co., are entitled to all credit which can be given them. *A First Premium.*

No. 645. Tailors' shears, made by R. Heinish, Newark, N. J., deposited by C. H. Harkness, fully equal to former specimens, for which they received a first premium.

No. 661. Machine and hand cards, made by J. D. Sargeant & Co., Leicester, Mass., deposited by Billington & Emery, a good article worthy of the notice of manufacturers. *A Third Premium.*

No. 666. Vices and anvil, made by Fisher & Martin, Newport, Maine, deposited by Curtis & Hand.

No. 663. A lever vice, by J. S. Griffing, New Haven, Ct.

The vices are a serviceable article, and calculated to answer a very good purpose, but the judges not being able to decide about the anvil, would refer the whole subject to the *Committee on Science and Arts.*

No. 664. Locks and latches, made by Pierpont, Mallery & Co., New Haven, Ct., deposited by Curtis & Hand, a very handsome display of excellent goods. *A Second Premium.*

No. 666. Patent chain bolts, made by O. & C. Bush, Fall River, Mass., deposited by Curtis & Hand. This bolt is intended to take the place of tail bolts, which it will no doubt do in many instances where the old style of bolt would be too expensive. This article combines length and strength sufficient for ordinary purposes. *A Second Premium.*

No. 670. Cast iron bell levers, made by J. H. Pugh, Philadelphia, deserving attention, as they will answer all the purposes of the old style brass at much less cost and equally durable,—they are very neat. *A Third Premium.*

No. 675. Assortment of bits, by J. M. Fisher, Philadelphia, a very handsome display of good serviceable goods. *A Second Premium.*

No. 677. Dental and other files, made by R. Murphy, Philadelphia. Equal to former specimens, for which he has received a first premium.

No. 679. Patent Gun, by A. Wurfflein, Philadelphia. Beautiful workmanship. *Referred to the Committee on Science and the Arts.*

No. 683. Guns, pistols and locks, made by W. Robertson, Philadelphia. A good substantial article. *A Second Premium.*

No. 688. Gilt buttons, made by F. Hayden & Son, Waterbury, Conn., deposited by D. D. Byerly. Elegantly finished articles, and well worthy of *A Third Premium.*

No. 692 and 693. Reveal and common shutter hinges and wrought bolts, made by Heins and Adamson. Very excellent goods, finished in first style, creditable to the makers. *A Second Premium.*

No. 694. Weavers' reeds, made by J. A. Gowdy, Providence, R. I., deposited by J. K. Devine. These are first class goods, and of beautiful finish, and worthy *A First Premium.*

No. 1265. Plano-relievo plates for doors, made by Jacob Maas & Sons, deposited by W. A. Maas. These are handsome and good articles, well deserving of attention. *A Third Premium.*

No. 1210. Stencils made and deposited by E. B. Foster, equal in all respects to No. 613, and like them entitled to *A Third Premium.*

The judges speak favorably of

No. 601. Augers and gimlets, made by A. Conrad, Whitemarsh, Montgomery co., Pa., deposited by S. H. Bibighaus. A good article and sustains the reputation of the maker.

No. 603. Sand paper, made by R. H. & J. G. Ishard, N. Y., deposited by Lewis S. Peck.

No. 605. Iron brands, made and deposited by M. Costello, Phila.

No. 656. Iron brands and stamps, made by J. Franklin & Son, Philadelphia. Very creditable to the maker.

No. 608. Scythes, made by Mansfield & Lamb, Smithfield, R. I., deposited by Dilworth, Branson & Co.

No. 609. Sand paper, made by R. Boyd, N. Providence, Delaware co., Pa., deposited by Dilworth, Branson & Co.

No. 611. Candle moulds, made by W. McQuilkin, Philadelphia.

No. 614. Razor Strops, made and deposited by L. Chapman, Philadelphia.

No. 615. Spades, forks, &c., made and deposited by Prouty & Barrett.

No. 619. Coffee mills, by W. C. Lawson, Philadelphia.

No. 620. Patent combination locks, by S. W. Colton, Philadelphia.

No. 1567. Machine cards, made by Jas. Smith & Co., Philadelphia.

No. 623. Gum elastic door springs, made by Ames & Newell, Wadawanuck, Connecticut, deposited by Cresson, Fisher & Co.

No. 626. Shoe knives, made by Moran & Fulton, Mansfield, Mass., deposited by E. Lewis.

No. 627. Six scythes, made by Roby & Sawyer, N. Chelmsford, Massachusetts.

No. 629. Blind hinges and blind fixtures, American Window Trimming Co., Taunton, Mass., deposited by L. S. Talbot.

No. 630. Cast iron molasses gate, made by Benedict & Ball, deposited by S. Hart, jr.

No. 631. Stair rods, made by M. Gold, Philadelphia.

No. 642. Six planes, made by E. W. Carpenter, Lancaster, Pa., deposited by W. M. McClure.

No. 647. Wood screws, made by the Hartford Hardware Co., Hartford, Conn., deposited by Steinmetz & Justice.

No. 649. Chisel, made by Wilcox & Co., deposited by Steinmetz & Justice.

No. 650. Hoe, made by E. C. Tuttle, Naugatuck, Conn., deposited by Steinmetz & Justice.

No. 651. Patent axle pulley, made by Judd, and deposited by Steinmetz & Justice. Has the advantage over the former style in some respects, and a very well made article.

No. 1718. Shuttles, made by Vanhorn & Heller.

No. 665. Molasses gates, made by Gifford & Chase, deposited by Curtis & Hand.

No. 676. Butcher's knives, Bradshaw & Purlee, N. York, deposited by E. Lewis.

No. 684. Wrought hinges, A Roy & Co., Watervliet, New York, deposited by Thompson, Carr & Co. Sustain their reputation.

No. 696. Brace and bitts, made by John Gardiner, Philadelphia.

No. 697. Rifle, made by A. K. Brown, Philadelphia.

No. 698. Shoemakers' tools, made by C. H. Blittersdorf, Phila.

No. 699. Lock, made by C. Crawford, Philadelphia.

No. 700. Rifle barrels, made by C. Lehman, Lancaster co., Pa.

No. 701. Planes, made by Colton & Sheneman, Philadelphia.

No. 721. Files, made by Ankrim & Co., Pittsburg, deposited by M. W. Baldwin.

No. 711. A case of saddlers' tools, &c., by H. Huber, jr., Philadelphia. These beautiful goods fully sustain, in all respects, the reputation of the maker.

IX. *Saddlery and Harness.*

The judges report the display of Saddlery and Harness as exceedingly meagre, and decidedly inferior to that of previous exhibitions. They regret, that while the Saddle and Harness Makers of this city produce very beautiful specimens of their art, so few should find their way into the Exhibition.

The display of trunks and valises is good.

They award as follows:

No. 389. One set double harness, made and deposited by A. C. Ingram, Philadelphia. Substantial workmanship. *A Third Premium.*

No. 377 and 403. Two saddles, made and deposited by Wm. H. Hawkins, Philadelphia. *A Second Premium.*

No. 338. One case harness ornaments, made and deposited by C. G. Smith, Philadelphia. Handsome design and workmanship. *A Second Premium.*

No. 350. Valise trunk, carpet bags and ladies satchels, made and

deposited by Thos. W. Mattson, Philadelphia. More than sustains his reputation. *A First Premium.*

No. 365. Two trunks, made and deposited by John Unruh, Philadelphia. Sustain the reputation of maker. *A Second Premium.*

No. 402 1-2. Bridle, made and deposited by Henry Seitz, Columbia, Lancaster co., Pa. *Referred to Committee on Science and the Arts.*

The judges notice favorably,

No. 313. One card harness ornaments, made by J. L. Seiger, Baltimore, Md., deposited by Geo. Booth.

No. 369. Cart saddle with elliptical springs, made by John Harman, deposited by John Case.

No. 323. Trunk, made and deposited by Thos. W. Mattson, Phila.

No. 274. Two sole leather trunks, and two carpet bags, made and deposited by Jacob Moyer, Philadelphia.

No. 378. Traveling sea trunk, made by J. Sebe, Wilmington, Del., deposited by Gillis & Ruggle.

No. 379. Trunk, made by Isaac Hammitt, Philadelphia.

No. 391. Three trunks, made and deposited by E. P. Moyer, Phila.

X. *Models and Machinery.*

The judges make the following awards:

No. 1506 and 1507. Coupling joints, by West & Thompson, N. Y. Already referred to *Committee on Science and the Arts.*

No. 1519. Whip saw machine, by Benjamin Ingram, Philadelphia. *A Third Premium.*

No. 1526. Progressive Lever Presses, by David Dick, Meadville, Crawford county, Pa. *Referred to Committee on Science and the Arts.*

No. 1530. Barrel Machine, by Wm. Trapp, jr., Philadelphia. *A First Premium.*

No. 1533. Marine Hydrometer and Marine Clock, by Stillman, Allen & Co., N. Y., deposited by D. G. Wells. *Referred to Committee on Science and the Arts.*

No. 1538. Direct Action Steam Pumps, by C. W. Fulton, Baltimore. *Referred to Committee on Science and the Arts.*

No. 1576. Model Steamboat wheel, by R. L. Curry, Philadelphia. *Referred to Committee on Science and the Arts.*

No. 1579. Centre vent Water wheel, by Thatcher, Boston, Mass., deposited by E. Tuttle. *Referred to Committee on Science and the Arts.*

No. 1720. A shaft spring, invented by T. S. Speakman, Philadelphia, made and deposited by Heins and Adamson. *A Third Premium.*

The judges mention favorably the following:

No. 1520. Patent filtering cocks, by Wm. Sweet, N. Y.

No. 1529. Ruggles' Card Press, by M. Ruggles, Boston, Mass.

No. 1565. Platform Scales, by Ellicott & Abbott, of Philadelphia.

No. 1683. Scale Beams, by D. T. Stuart, Philadelphia.

No. 1689. Platform Scales, by E. & T. Fairbank, St. Johnsburg, Vt., deposited by G. B. Norris.

No. 1590. Porter's Dray, by Wm. Snider, Philadelphia.

No. 1602. Machine for Morticing and boring Hubs, by John McClintock, Philadelphia.

No. 1603. Mortising machines, do. do.

No. 1686. Self-stripping Card, by Joseph Turner, Philadelphia.

No. 1687. Improvement on Danforth spinner, by do. do.

No. 1701. Gutta Percha belting and specimens from the American Gutta Percha Company, New York, by John Thornley.

No. 1705. Machine for weaving 3 ply Carpeting, by Jno. Nott, Phila.

No. 1706. " " " Ingrain Carpeting, " " "

Nos. 1728, 1729. Plated Fancy Registers, made by Culver & Tuttle, N. Y., deposited by B. M. Feltwell.

No. 1732. Cast Iron Hexagon Chimney Top, by B. M. Feltwell, Philadelphia.

No. 1773. Machine for making Ships treenails, by N. O. Mitchel, Gardiner, Maine.

No. 1552. A water close stool, by Evans & Watson.

No. 1535. 5 Hydraulic Rams by W. & B. Douglas, Middleton, Conn., deposited by Dilworth, Branson & Co.

No. 1600. 1 Hydraulic Ram Engine, do. do.

No. 1691. Hydraulic Ram, by P. Martin.

No. 1724. " " by Berkinbine & Martin.

No. 1925. " " " " "

No. 1730. Hydraulic Rams, Garchell's Patent, made and deposited by Allen Gawthrop, Chester county.

XI. *Stoves and Grates.*

The judges report that the collection in this department appears to be quite equal in extent and importance to any previously exhibited. The cook stoves embrace a great variety of patterns and are a source of much attraction to the housekeeping portion of the community. There does not, however, appear to be among them, any displaying such a degree of superiority over those heretofore exhibited as warrants the award of a first premium.

They make the following awards:

No. 1523. Three Nursery Stoves, made and deposited by Jackson & Morris, Philadelphia, neat, well made, and convenient,
A Second Premium.

Nos. 1512, 1513, 1514. Cook Stoves of Brooks's patent, (hot blast) made and deposited by North & Harrison, Philadelphia. Recommended for economy and convenience, to *A Second Premium.*

No. 1587. Bath Boiler, made and deposited by H. Johnston, Philadelphia. Remarkably good workmanship, *A Second Premium.*

No. 1502. Four air tight Brick oven cook stoves;

No. 1503. One radiating parlor stove;

No. 1504. Six Cast-Iron, air tight, made by Johnson & Cox, Troy, N. Y., and deposited by Cox & Boughton, *A Second Premium.*

No. 1508. 3 Cook Stoves, made by F. W. Most, Philadelphia; excellent pattern. *A Third Premium.*

No. 1542. Double Oven Cook Stove, by J. Feinour, Philadelphia, simple and efficient *A Third Premium.*

No. 1552. Union range and air heater, by Prouty & Barratt, Philadelphia. *A Third Premium.*

Nos. 1621–4. Cook Stoves, by Warnick, Lybrand & Co., Philadelphia. *A Third Premium.*

No. 1682. Radiator Stove, by Foering & Co., Philadelphia. *A Third Premium.*

The judges notice the following with commendation.

No. 1540. Cook Stove of J. Kisterbock, Philadelphia, still maintains its good character for economy and durability, for which on a former occasion it has received a first premium.

No. 1631. A kitchen range by B. M. Feltwell, Philadelphia.

No. 1517. Bay State Cook Stove, Peck & Co., Springfield, Mass., deposited by Wm. Yard, Philadelphia.

No. 1595. Two similar Stoves, by Washington Harris, Philadelphia.

No. 1632. Improved Cook Stove, by Adam Ketler, Philadelphia.

No. 1678. 3 Parlor & Cook Stoves, by J. S. Clark, Philadelphia.

No. 1700 2 Cast Iron Radiators, by Weaver & Volkmar, Philadelphia, of good form and finish.

No. 1511. Epicure Cook Stove, by John Stewart, Philadelphia.

The furnaces for warming apartments are generally censured for faulty arrangement, in not allowing free access of fresh air in sufficient volume in order to prevent the over heating of the radiating surface.

The following may be exempted from this stricture.

Nos. 1534, 1630. Cast Iron Furnace of Culver's Patent, deposited by B. M. Feltwell.

No. 1546. Cast Iron Heater by G. W. Walker, New York, deposited by R. S. R. Andrews.

No. 1589. Heater by G. Fox, New York, deposited by Peters & Co.

No. 1547. Model of Heater for heating houses by hot water, by R. S. R. Andrews, Philadelphia.

XII.—*Cabinet Ware.*

The judges complain of the paucity of the specimens of this branch of manufacture, in the Exhibition of this year, in comparison with the large amount of elegant and costly productions which make their appearance yearly in our city.

The judges report the following awards:

No. 962. Case of Bows and Arrows, made and deposited by Saurman & Magarahan, Philadelphia. For beauty and accuracy of workmanship, *A First Premium.*

No. 1214. Japanned Tables, made and deposited by Daniel D. Dick, Philadelphia. For their exceeding beauty, *A First Premium.*

No. 1221. Enamel Painting, by John Wilson, Philadelphia. For fine taste and beauty of execution, *A First Premium.*

No. 1297. Inlaid Tables, by Karstien & Smith, Philadelphia. For style, execution and finish, *A First Premium.*

No. 1236. Six Looking Glass and Picture Frames, by Wm. Johnson & Co., Philadelphia, *A Third Premium.*

No. 425. A lot of Glue, by Bodine, Baeder & Co., Philadelphia,
A Third Premium.

The judges report commendatory notices of

No. 1201. A centre table, made by Wm J. Harrison, Philadelphia.

No. 1284. Extension writing desk, by John Smith, N. Y., deposited by B. D. Roberts.

The various lots of Venetian Blinds, received the encomiums of the judges.

No. 1296. Fancy work Box, by H. W. Hazzard, Philadelphia.

XIII.—*Musical Instruments.*

The square pianos, do not surpass those deposited in the last Exhibition.

The judges make the following awards.

No. 1235. Grand piano, made by J. Chickering, Boston, deposited by E. S. Walker. For great power, compass, and finish, combined with excellence of tone. *A First Premium.*

No. 1333. A case of reeds and pipes for organs, made by J. C. B. Stanbridge, Philadelphia. Fine tone and finish. *A First Premium.*

No. 1256. One Accordion, by Anthony Faas, Philadelphia. For improvements and ingenuity. *A Third Premium.*

The judges notice favorably,

No. 1264. Pianos, by C. Meyer, Philadelphia.

No. 1260. Pianos, by the Philadelphia Manufacturing Company, deposited by Joseph Lane.

XIV.—*Glassware.*

No. 690. Made and deposited by Hartell & Lancaster, Union Works, Kensington, Philadelphia. An extensive and beautiful display of colored glass, made in a bottle furnace from open pots, also mineral water bottles, carboys, druggists' glassware, and articles for the use of chemists. The mineral water bottles are very superior in the uniformity of thickness of the glass. The colored glass for perfumers, is fully equal to that exhibited last year, for which a first premium was awarded. In a communication from the manufacturers, they state that by improvements discovered and adopted, they are prepared to sell their goods at greatly reduced prices from the last year, a reduction in the price of production being a valuable result in the arts, they recommend
A Recall First Premium.

No. 1287. Stained window glass, made and deposited by Euston & Weer, Philadelphia. The judges are pleased to observe in accordance with a hope expressed by the judges at the last Exhibition, that there has been an improvement in this branch of the arts. In this collection many of the colors are brought out, the only failure is in the red, which may be due to the coloring material, and not the fault of the manufacturers, the design is tasteful, and artistical effect good. The judges recommend an award of *A Second Premium.*

No. 1329. Stained and ornamented window glass, made and deposited by John Gibson, Philadelphia. This collection embraces a limited variety in the art, but is deserving of praise for its artistical beauty.

The attention of the judges was called to some Druggists' jars containing drugs, deposited by Messrs. Powers & Weightman; the glass is very white and free from blemishes, but the jars are not so well made as is desirable.

No. 691. Toilette bottles, made and deposited by Thomas Hartell of Philadelphia, deposited as specimens of the first colored flint glass made in this country.

XV.—*Books and Stationery.*

No. 69. A case containing a copy of the last edition of Dr. Webster's Dictionary of the English language, in quarto form, designed as a present to the queen of England. This is a beautiful specimen of the perfection to which the manufacturing of books has been brought in this country, the design for illuminating the edges of the leaves, and the method of applying, are entirely new, and produce a fine effect. The workmanship throughout is of a very superior order, for this case and Nos. 39 and 69, made by J. B. Lippincott & Co., *A First Premium.*

No. 65. Lead pencils, made by A. G. Fay & Co., Concord, Mass., deposited by H. L. Lipman, are a very superior article, the lead is very fine, the color good, and manufactured in a first rate manner throughout. *A First Premium.*

No. 77. Straw boards, for Bookbinders and box makers, made by Shryock & Co., Philadelphia, an article of superior finish, and deserving especial notice from manufacturers. *A First Premium.*

No. 54. Brass Dies, &c., by W. M. Thompson, New York, used for ornamenting book covers, are superior specimens of the art, and entitled to *A First Premium.*

No. 11. Slates, made by R. M'Dowell & Co., Philadelphia, considered a very superior article, and entitled to *A First Premium.*

No. 82. Specimens of wood engravings, engraved by Croome, Philadelphia, printed by Griggs & Adams. The lines are very fine and distinctly brought out, without the usual over and underlaying. The effect of the light and shade is admirable, the Committee think the Messrs. Griggs & Adams have done themselves great credit. *A Third Premium.*

No. 52. Universal Atlas in folio, a most beautiful specimen of the art of transferring and lithographic printing, from the press of P. S. Duval, Philadelphia, transferred by Bourquin. *A Third Premium.*

The judges make favorable mention of

No. 56. Two large maps of Pennsylvania, printed and colored by R. L. Barnes, Philadelphia.

No. 15. Blank books, by W. H. Maurice, Philadelphia, a very good specimen of work, particularly in the ruling, which the Committee consider superior in accuracy and evenness of color.

No. 22. Blank books, by Adams & Brothers.

No. 66. Improved movable binder, for the temporary binding of letters, invoices, &c., by Wm. Mann of Washington, D. C., deposited by maker, an article of great convenience to business men.

No. 67. Newspaper files, by the same, upon the same principle.

XVI.—*Fine Arts.*

The judges have the satisfaction of reporting a favorable change in this department of the exhibition. The daguerreotypes have reached a high degree of perfection, and the specimens of printing in colors are greatly commended.

They report the following awards:

No. 1211. Lithographic printing in colors, by A. Britt, Philadelphia. *A First Premium.*

No. 1267. Lithographic Printing in colors, by Thos. Sinclair, Philadelphia. *A First Premium.*

No. 628. Chasings on metal, by E. Wagner, Philadelphia, excellent in execution and chaste and beautiful in design. *A First Premium.*

No. 1338. Daguerreotype portraits by M. A. Root, Philadelphia. *A First Premium.*

No. 1399. Daguerreotype portraits by M. P. Simons. *A First Premium.*

No. 1240. Daguerreotype views of Cincinnati, by Fontayne & Porter, Cincinnati, Ohio. *A First Premium.*

No. 1292. Daguerreotype portraits, by England & Gunn, Philadelphia. *A Second Premium.*

No. 1209. Daguerreotype portraits. by M'Clees & Germon, Philadelphia. *A Third Premium.*

No. 1307. Vase with carving in ivory, by Andrew Wurfflein, Philadelphia. *A First Premium.*

No. 1220. Transfers from steel and copper to stone, by Frederick Bourquin, Philadelphia. *A First Premium.*

No. 1230. Landscape in oil, by P. Weaver, Philadelphia. *A Second Premium.*

No. 1276. Specimens of penmanship, by Jas. Hallowell, jr., Philadelphia. *A Third Premium.*

They notice favorably,

No. 1233. Drawings by pupils of G. R. Holmes.

XVII.—*Jewelry and Silver Ware.*

The judges regret that the display this season is much smaller than usual.

They make the following awards.

No. 641 & 682. Cases of silver ware by Wm. Wilson, Philadelphia, fully sustain the reputation of the manufacturer. *A First Premium.*

No. 684. Silver Pencils and Gold Pens, by M. S. Fife, Philadelphia. *Referred to Committee on Science and Arts.*

They make favorable reports of

No. 654. A case of silver pencils and gold pens by J. J. Hatcher, Philadelphia.

No. 643. A glass show case, by W. S. Peters, Philadelphia.

XVIII.—*Marble and Statuary.*

The judges make the following award.

No. 1318. Specimens of composition marble, by Thos. W. Dufrene, Philadelphia. Beautiful imitation of marbles. *A First Premium.*

They notice favorably,

Nos. 1680 & 1681. A marble Egyptian enclosure and lamb, and marble posts, by H. S. Tarr, Philadelphia.

No. 1306. A marble urn, from a design by Hoxie & Button, by Henry S. Tarr, Philadelphia.

XIX.—*Hats and Caps.*

The judges notice a general improvement in this branch of manufacture, especially in the article of silk hats, which will favorably compare with the Parisian. They have to regret, however, the disappearance of the products of our larger fashionable establishments.

They report the following awards:

No. 945. Moleskin hat, made and deposited by Wm. Hudson, Philadelphia, a lad of 16 years of age. A perfect specimen of a hat.
A First Premium.

No. 927. Caps, made by Messrs. Elfelt, Brothers, Philadelphia.
A Third Premium.

No. 966. A case of silk hats, by Samuel Hudson, Philadelphia.
A Third Premium.

No. 999. Silk hats, by Geo. G. Getz, Philadelphia. *A Third Premium.*

They notice favorably,

No. 915. A case of caps, by P. Erhard, Philadelphia.

No. 958. A case of hats, by Joshua Bower, Philadelphia.

No. 963. Beaver and Neutria hats, by Benj. Lightfoot, Philadelphia.

No. 995. Hats, deposited by F. & J. D. Campbell, Philadelphia.

No. 1000. A case of hats, by E. S. Williams, Philadelphia.

XX.—*Furs.*

No. 1012. A case of Russia sable, stone, martin, chinchilla, muffs and boas, made and deposited by G. F. Womrath, Philadelphia. The furs are all very fine quality, most excellent dressing, well stuffed, the style of trimming, as well as general finish, are very superior, they have all been well matched, but we would suggest to the maker, that in so fine an article as the Russia sable muff, valued at three hundred dollars, more of the head and neck might have been trimmed off to advantage. For the great superiority of this lot, we award *A First Premium.*

No. 944. A case of Hudson's Bay martin, natural lynx, fitch muffs and boas, mostly good skins and well dressed, the skins, however, have too much left of the head and neck, the stuffing of the muffs is inferior, and the matching is not as good as it ought to be, for the fine quality of the fur; to the makers, Solis & Brothers, 86 Arch Street, we award
The Third Premium.

XXI.—*Combs and Brushes.*

The judges report that no combs were offered for their consideration, and but two cases of brushes.

They make the following award:

No. 1037. Case of brushes, by Messrs. Abel & Bicknell, Philadelphia, chaste and beautiful in design, and superior in workmanship. The ivory handle tooth brushes, and bone handle hair brushes, are believed to be the first of the kind manufactured in the country, in quantities.
A First Premium.

XXII.—*Coach Work.*

No. 1768. New axle, by Chinnock & Co., New York, the invention consists of a small ball which rolls in a groove made in the axle. It is we believe new, and

Refer it to the Committee on Science and the Arts.

No. 1626. A tilbury, made by W. D. Rogers, Philadelphia, a handsome new style of finish and good workmanship. *A First Premium.*

No. 1577. Brewer's dray, by B. Flum, Philadelphia, substantial and well built, new style, of good material and workmanship, we award *A First Premium.*

No. 1742. An omnibus, by J. Stephenson, New York, good style and excellent workmanship, which does great credit to the workmen, we award *A First Premium.*

No. 1694. A hose carriage, by G. W. Watson, Philadelphia, of fine style and superior workmanship. *A First Premium.*

No. 1673. A sulkey, by Chas. Scattergood, Philadelphia, creditable specimen of work. *A Third Premium.*

No. 1590. A porter's dray, by Wm. Snyder, Philadelphia, heavy and strong, excellent material and workmanship, equal to any heretofore exhibited.

XXIII.—*Leather.*

The finest display ever offered at the exhibition, in quantity and variety as well as quality and finish.

The judges make the following awards:

No. 347. One dozen calf skins, deposited by H. M. Crawford, Philadelphia. A very superior article. *A First Premium.*

No. 362. A lot of sole leather, made and deposited by C. B. Williams, Philadelphia. *A First Premium.*

No. 331. One dozen calf skins, deposited by Thos. Mogridge, Philadelphia. *A Second Premium.*

No. 368. One dozen russet calf skins, and a lot of skirting, deposited by Wm. Forepaugh, Philadelphia. *A Second Premium.*

No. 284. Two rolls of shoe skirting, made and deposited by Thos. Naulty, Philadelphia. *A Second Premium.*

No. 394. Seven sides russet leather, by H. Davis, Philadelphia. *A Second Premium.*

No. 390. Two rolls of shoe skirting, made and deposited by R. Hutchinson, Philadelphia. *A Third Premium.*

No. 348. The specimen of enameled chaise leather, made and deposited by the Messrs. Wards of Newark, N. J., the judges believe to be the largest hide ever exhibited, and the quality in connexion with its size, they think, will compete with any ever manufactured. The specimens of colored leather of various kinds, by the same, are equally creditable, and are a happy illustration of the progress of American manufactures. For the general excellence of their deposit, the committee, in accordance with the report of the judges, recommend to the Institute the award of a gold medal.

No. 385. Two sides band leather, by E. Middleton, Crosswicks, New Jersey. *A Third Premium.*

They make favorable mention of the following:

No. 315. Six sides of shoe skirting and enameled leather, by John Riehle & Co., Philadelphia.

No. 339. One dozen thong leather, by A. Briggs & Co., Winchester, Ct., deposited by Jno. H. Chambers & Co., Philadelphia.

No. 361. A lot of sole leather, by W. H. Crawford, Philadelphia.

XXIV.—*Morocco.*

The remarks on leather are entirely applicable to the display of morocco.

No. 336. Morocco by Taylor & Eveland, Philadelphia. One dozen Patna dyed kid, very good. One dozen Tampico French black dyed superior leather, and remarkable finish, worthy of *A First Premium.*

No. 319. A lot of Tampico, French and glazed morocco, by C. J. Shorday, Philadelphia, superior in color to any leather, very good, and worthy of *A First Premium.*

No. 366. A lot of Turkey finish morocco, by Adam Smith, of Philadelphia, of different colors, for bookbinders, a superior article, worthy of *A First Premium.*

No. 353. One dozen Tampico French morocco; one dozen Madras French; one dozen Tampico brush, all black, good leather and well finished. Two dozen black glazed and brush kid, the leather first rate, colored and finished in a superior manner; made and deposited by G. S. Adler, Philadelphia, entitled to *A First Premium.*

No. 388. One dozen Tampico French dyed black color, very good and finish the same. One lot of bronzed French morocco, same as the above, made and deposited by Middleton & Co., Crosswicks, N. J., and which we award *A Second Premium.*

XXV.—*Boots and Shoes.*

The judges on boots and shoes report as follows:

No. 324. One case fine boots and shoes, made and deposited by Jno. Heumann, Philadelphia, good articles similar to those exhibited previously.

XXVI.—*Chemicals.*

The judges take pleasure in reporting that the display of Chemicals this season is greatly superior to that of any previous occasion.

They make the following awards:

No. 402. A magnificent display of Chemicals by Messrs. Powers & Weightman, Philadelphia, late Farr, Powers & Weightman. They enumerate as particularly deserving of notice, the Sulphate of Quinine and Morphine, Arseniate and Citrate of Quinine, Tartar emetic, Piperine, Red precipitate, Nitrate of Silver and Santonine, which is here exhibited for the first time; the large specimens of Alum, are of superior whiteness and beauty of crystallization. The chemicals of these gentlemen, are superior to those of last year. The committee recommend to the Institute to award *A Recall Gold Medal.*

No. 351. Chemicals, by Smith & Hodgson, Philadelphia. The specimens of acids, Chloroform, Syrup of Iodide of Iron, Extract of Krameria,

Valerianate of Zinc, Chromic Acid, Oxide of Chrome, and Bicarbonate of Soda in lumps, are particularly noticed.

A Recall First Premium.

No. 395. Mineral water, by E. Roussel, Philadelphia.

A Recall First Premium.

No. 321. Specimens of Metallic Iron, by William Proctor, Philadelphia. For superior purity and make, *A First Premium.*

No. 312. Chemicals, by Chas. Ellis, Philadelphia. The oils of Cubebs and Copaiva, Citrate and Acetate of Iron, Citrate of Quinine, Extract of Krameria, and Tannin, are noticed. *A Second Premium.*

Nos. 396–7. A case of 200 specimens of Materia Medica, and various chemical preparations, by Edward Parrish, Philadelphia. The former are arranged for medical students, and the style in which they are got up is very creditable. Among the latter are noticed, the Citrate of Magnesia, a pleasant purgative, and the Solution of Gun Cotton in Ether.

A Second Premium.

No. 328. Black Lead Crucibles, from Phœnix works, Taunton, Mass., deposited by Cresson, Fisher & Co., *A Second Premium.*

No. 340. Black Lead Crucibles, by J. W. Ingell, Taunton, Mass., *A Second Premium.*

No. 329. Powdered Drugs, by Haskel & Merrick, N. Y., deposited by Thomas S. Wiegand, *A Second Premium.*

No. 327. Blacking, (Liquid) by W. Curry, Philadelphia, *A Second Premium.*

No. 375. Polishing paste for Silver Ware, by Howell & Read, Philadelphia, *A Third Premium.*

No. 380. Mineral water, by A. McFarland, Philadelphia, *A Third Premium.*

They notice with commendation,

No. 341. Prussiate of Potash, by H. W. Worthington, Philadelphia. A fine display: sustains the reputation of the maker.

No. 318. Magnesia in bottles, by G. Bley, jr., Philadelphia.

No. 309. Case of Chemicals, deposited by Linn, Smith & Morgan, Philadelphia.

No. 317. Chemicals, by H. M. Troth, Philadelphia. The Iodides of lead and mercury are particularly noticed.

No. 401. Nitrate of Ammonia, by Geo. Canby, Philadelphia.

No. 301. Disinfecting Fluid, by Dr. Feuchwanger, New York.

No. 325. Two boxes of Starch, by S. F. & G. W. Stratton, Philad.

No. 314. American Mustard, by Fell & Brother, Philadelphia.

No. 360. Ground Spices, by C. Hutchinson, Philadelphia.

XXVII.—*Philosophical Apparatus.*

The philosophical apparatus, brought under the consideration of the judges, is greater in amount and higher in character, than has been exhibited, for several years.

The judges make the following awards:

No. 602. Model of a Hydrostatic Press;
No. 686. Magneto-Electrical Machine;
No. 1627. Model of a Steam Engine,
made by L. C. Francis, Philadelphia.

For excellence, skill, and workmanship, *A First Premium.*

No. 646. Case of Philosophical apparatus, by T. J. Weygandt, Philadelphia. This case contains a very delicate Thermo-multiplier, and a new pole changer, which do great credit to the artist. For ingenuity, skill, and workmanship, *A First Premium.*

No. 652. Balance for weighing silver coin, made for the chief coiner of U. S. Mint, by Jos. Canby, Philadelphia. The workmanship displayed is of a very high order. *A First Premium.*

No. 658. Scales, Weights and Measures, by F. Meyer & Co., Philadelphia, sustain the artist's reputation; *A Recall First Premium.*

No. 632. Chromatrope by H. S. Nolens, Philadelphia, neatly and delicately painted, *A Second Premium.*

Nos. 674 and 681. Chase's double acting magnetic machines, by A. F. Porter, Philadelphia, *A Second Premium.*

No. 673. Case of Electro-magnetic apparatus, by G. W. Risdon, Philadelphia, *A Third Premium.*

No. 616. Electrical machine, by G. Boshart, Philadelphia, *A Third Premium.*

No. 659. Voting Machine, by F. C. Goffin, Trenton, N. J. *Referred to the Committee on Science and the Arts.*

No. 695. Legislative Telegraph, (vox populi) by R. E. Monaghan, Chester county, Pa. *Referred to the Committee on Science and Arts.*

No. 1286. Patent universal joint, by Wm. Wurdeman, Washington, D. C. *Referred to the Committee on Science and Arts.*

They favorably notice the following:

No. 634. Magneto-electrical machine, } by J. P. Stratton, Philadel-
No. 635. Electro-magnetic machines, } phia.
No. 640. Case of Electro-magnetic machines, by C. & J. Neff, Phila.
No. 671. " " " " by W. H. Pile, "

XXVIII.—*Straw Goods.*

The judges notice an improvement of this part of the Exhibition, and trust that they may have greater cause for the same remark in future, as there are several thousand persons employed in this city in this branch of manufacture.

No. 1029. Bonnets, made and deposited by Thos. White, Philadelphia, straw bonnets made of English split, patent, and luton plait, are perfect in shape, and the bleaching and pressing deserve much praise.

Also six chapeaux "pamela," these bonnets are made entirely of American stock, the braid being plaited, and the bonnet manufactured in the establishment of the depositor; they are of great purity of color, and in shape as well as the presswork, meet the commendation of the Committee; the six pieces of the plait deposited with them, evince much care in the braiding, for the six chapeaux pamela, we award the *First Premium.*

No. 970. Chapeaux pamelas, made and deposited by Mrs. Susan Kendall, New York, for the making only; these bonnets fully sustain their great beauty in color and finish, for which your Committee recommended a premium last year.

No. 1035. An infant's summer hat, made of corn husk, by the pupils of the Orphan Asylum at Natchez, Miss., deposited by J. R. Lambdin,

Philadelphia, the material being plaited and then sewed in the proper shape. In consideration of the ingenuity displayed by the juvenile makers, it also bringing a waste material into profitable use; we award the *Third Premium.*

We beg leave to call the attention of straw manufacturers to the husk of the Indian corn, as an abundant and cheap material which we have no doubt will be found suitable for summer wear, for the youth of both sexes; twisted and plaited it would closely resemble the panama hats, and no doubt could be produced at a much less cost, besides that its value would entirely consist in the labor of females.

XXIX.—*Surgical Instruments.*

The judges report that the number of articles in this branch deposited in time for competition, was small, and few of them exhibit sufficient improvement over those displayed in former Exhibitions, to merit notice.

They make the following awards:

No. 678. A case of teeth, by Jones, White & Co., Philadelphia, are remarkable for their beauty of finish, and worthy of *A Second Premium.*

No. 669. Dentists' work, by C. S. Beck, Philadelphia, with a new application of the principle of atmospheric pressure, to retaining teeth in their proper place, very neat and well finished. *A Third Premium.*

They notice favorably,

No. 710. A model of an artificial leg, by B. F. Palmer, Merdith, N. H., displays great ingenuity in its construction, is well finished, and seems admirably adapted to the purposes for which it is intended. The judges, however, not having had an opportunity of witnessing a full sized limb constructed after this model, in operation on the living subject, must decline giving a positive opinion as to its practical merits. They do this with the less hesitation, since the merits of the invention are at present undergoing investigation before the Committee on Science, and the Arts of the Institute.

No. 727. An artificial leg, by F. O. Deschamps, Philadelphia, *Referred to the Committee on Science and Arts.*

XXX.—*Perfumery.*

In accordance with the report of the judges, the Committee make the following awards:

No. 333. Made and deposited by H. P. & W. C. Taylor, is particularly characterized by the large amount and excellent quality of the transparent soap, for which the manufacturer has been celebrated during many years. The Committee notice as novel and beautiful the transparent red soap of this lot, is entitled to *A First Premium.*

No. 346. Perfumery and soaps, made and deposited by E. Roussel & Co., Philadelphia, being the finest display in the Exhibition, as an improvement over preceding Exhibitions, the Committee think entitled to *The Recall First Premium.*

No. 948. A large lot of excellent snuff and chewing tobacco, by W. A. Appleby, Philadelphia, for the general superiority, *A Second Premium.*

No. 305. Large mass of palm soap, by G. R. Graves, West Chester, Pa., is very creditable in color and solidity, and it reflects credit on the manufacturer, for the palm soap he is awarded

The Third Premium.

They mention favorably,

No. 332. Soaps and perfumery, by Thos. Worsley, Philadelphia.

XXXI.—*Gum Elastic Goods.*

The Committee make the following awards:

No. 392. Gum elastic boots and shoes, by John Thornley, Philadelphia, of superior quality, and fully sustaining the reputation of the manufacturer. A new style of ornamenting in imitation of embroidery, is noticed as a pleasing novelty. *A First Premium*

No. 1580. India Rubber car springs, made by F. M. Ray, New York city, deposited by G. Whitney, N. Y.; exhibited for the first time, and being a new application of India Rubber, is

Referred to the Committee on Science and Arts.

XXXII.—*Copper, Brass, and Plumbers' work.*

The following award is reported by the Committee.

No. 1596. Three pieces refined ingot copper, by the Boston and Pittsburgh Mining Company, and deposited by Earps & Young, Philadelphia. The ore is from Lake Superior, it is very fine copper, and for care in smelting and refining, *A First Premium.*

No. 1690. Section of leading hose, by G. & W. Dialogue, Philadelphia, is favorably noticed. Also,

No. 1695. Large bell, by T. T. Dyer, Jr., Philadelphia, weighing 3675 lbs., a very good casting, but the volume of sound cannot be judged of correctly until the bell is suspended.

XXXIII.—*Tin Work.*

No. 1541. Case of tin toys, made and deposited by Francis, Field & Francis. Well made, and a good substitute for the German wooden toys, being stronger.

No. 1575. Tea canisters, by J. Hall Rohrman, Phila. Creditable articles.

No. 1674. Tin and japan ware, by W. Gilbert, Philadelphia. We notice with pleasure a great improvement over those exhibited last year by the same. *A Third Premium.*

No. 1633. Tin and japanned ware, by Isaac S. Williams & Co., Phila. The articles fully sustain the reputation of the manufacturers, for which a first premium was recommended last year by the judges; but as Mr. Williams is a member of the Board of Managers, no award could be given.

XXXIV.—*Paints and Colors.*

No. 302. Paints, made and deposited by Charles Hasse, Philadelphia, consisting of chrome yellow, Prussian blue, Fr. green, rose, pink, and wet lake. All excellent in quality, equal to the imported.

No. 310. One lot white lead, made and deposited by R. & J. Wharton, Philadelphia. Excellent in quality and soft in texture.

No. 398. A lot of white lead, by Wetherill & Bro. Also excellent in quality.

No. 364. Lot of water colors, by G. W. Osborne. Has every evidence of their former reputation.

No. 307 and 320. Lots of lamp black. Both excellent qualities.

No. 307. By Thomas Matlack, Philadelphia.

No. 320. By Thomas P. Wilson, Philadelphia.

No. 349. Six samples varnishes, by B. C. Horner, Philadelphia, From the color, consistency and clearness, the Committee think well of them, but to test them properly, it would require time to prove their durability.

No. 402. Vermillion, by Powers & Weightman, Philadelphia, is the nearest in tint to the Chinese, but not as strong in body.

XXXV.—*Fancy Goods.*

The Committee make the following awards:

No. 947. Eight cases prepared birds, by James Taylor, Philadelphia. For the beauty, variety of collection and execution of the work, *A First Premium.*

No. 994. Patent elastic swing, by John T. Townsend, Philadelphia. For its beauty and safety, and adaptation to the purposes of exercise, *A Second Premium.*

No. 920. Case of morocco goods, by Fry & Jones, Philadelphia. For ingenuity and workmanship, *A Second Premium.*

No. 916. One frame hair work, by Trautman Grob, Boston, deposited by Horace Logo, Philadelphia. The perspective of this piece is very good. *A Third Premium.*

No. 959. One frame shell work, by Mr. Lowber, Newark, N. J. For beauty of the collection and workmanship, *A Third Premium.*

No. 980. A box of shell work, by H. M. Chapman, Philadelphia. *A Third Premium.*

The following are favorably noticed:

No. 908. A collection of feathers, dyed and cleansed in this city, by Mrs. A. Griffiths.

No. 921. A case of lamp shades, by F. Quarre, Philadelphia. Very rich designs.

No. 933. A collection of mosses, from Nahant, by H. Basset, Nahant, deposited by J. Kite.

No. 941. A case of gloves, by G. R. Curry, Philadelphia. Have received a premium at a former exhibition.

XXXVI.—*Housekeeping Articles.*

The judges recommend the following awards:

No. 1619. Niagara shower bath, by Ephraim Larrabee, Baltimore, Maryland, which they pronounce perfect in all parts. May be used in all locations. *A Second Preimum.*

No. 1321. Patent spring bed, by P. O'Neill, Philadelphia.
A First Premium.

No. 1335. A patent spring mattrass, by E. Foliot, Philadelphia.
A First Premium.

No. 1280. An atmospheric spiral churn, by E. Spain, Philadelphia. On examination they consider this construction superior to any exhibited, and easily purified. Entitled to *A Third Premium.*

They notice favorably,

No. 1570. A refrigerator, by David Evans, jr., Philadelphia. They approve of the internal arrangements, and believe the slate lining and water-cock a decided improvement.

No. 1634. Refrigerator, by Nath. Waterman, Boston, deposited by D. R. Murphy. The ventilator a decided improvement, especially when lined with zinc, which requires more air.

No. 1606. Cast iron bath tub, by Savery & Co., decidedly preferable to those made of wood.

No. 1268. Door mats, made and deposited by Barnes & McKeachnie, New York. A very superior article worthy of the attention of the public, and greatly preferable to any before in use.

N. 1226. Brooms and brushes, made by John Shipman, Massachusetts, deposited by W. C. Allen. Well made and neatly finished.

No. 1222. A forcing-pump shower bath, made and deposited by Ellis L. Davis, Philadelphia.

No. 1551. Cracked wheat, by Caleb Clothier.

No. 1213. Bread, made without fermentation, by J. Moxey, Philadelphia. They pronounce it to be excellent.

No. 607. Weather strip, made by E. C. Matthewson, Hartford, Ct., deposited by Thos. Judd, Geneva, N. Y. An improvement worthy of attention.

No. 1334. Willow ware, by Chas. Askam, Philadelphia.

No. 1305. Hobby horses, by R. H. Ollson, N. Y., deposited by J. J. Taylor, Philadelphia.

No. 1225. Waffle Irons, by A. Jones, Philadelphia. A marked improvement upon the former invention, as it may be conveniently used over a coal fire.

No. 1563. Flour, made by Leech & Sons, Leechburg, Pa., deposited by A. Wright & Nephew. The best exhibited.

No. 1548. Flour, made by John Williams, Rochester, N. Y., deposited by Caleb Clothier.

No. 1550. Flour, made by Philip Garbutt, Wheatland Mills, Genesee, N. Y., deposited by Caleb Clothier.

XXXVII.—*Clothing and Needle Work.*

The Judges report, that although the display in this department of the Exhibition, is not so extensive as on some former occasions, there is still a very creditable collection. A manifest improvement in the patterns and execution of many specimens, is noticed with pleasure.

They make the following awards.

No. 904. Odd Fellows' regalia, by Curtis & Norcross, Philadelphia, elegant in design, and beautiful in embroidery. *A Second Premium.*

No. 964. Three cases of Odd Fellows' regalia, by Granville Stokes, Philadelphia, elegant in workmanship. *A Third Premium.*

No. 981. Frame of worsted work, by Mrs. Wickersham, Philadelphia, beautiful and elaborate. *A Second Premium.*

No. 911. Embroidered sofa seat, by Miss E. Berg, Trenton, N. J., a beautiful piece of raised worsted work. *A Third Premium.*

No. 924. Cotton bureau cover, by Mrs. M'Cannon, Philadelphia, the best specimen of knitted work in the Exhibition. *A Second Premium.*

No. 923. Knit shawl, by Miss Mary Sharp, Philadelphia, beautiful work. *A Third Premium.*

No. 937. Lot of clothing, deposited by Bennet & Co., Philadelphia. *A Third Premium.*

No. 952. Case of children's clothing, by H. G. Suplee, Philadelphia. *A Third Premium.*

No. 968. Bed quilt, by Mrs. Evans, Gettysburg, Pa. *A Third Premium.*

No. 969. Tufted quilt, by Mrs. D. D. Durborow, Chambersburg, Pa., beautiful in design, and neat in workmanship. *A Third Premium.*

No. 1013. Case of bead work, by Mrs. Moore, Philadelphia. *A Third Premium.*

They notice favorably,

No. 1046 Beautiful quilt, by Mrs. Conrad Meyer, Philadelphia.

No. 1014. French plaiting, by Mad. Juery, Philadelphia, equal to any exhibited in former years.

No. 906. Three pairs of window curtains, by Miss E. Williamson, Philadelphia.

No. 909. One case of fancy articles, by Mrs. Ann Boyce, Philadelphia.

XXXVIII.—*Ship Chandlery.*

The judges make the following award.

Nos. 1713-4-5-6. Steering wheel, block, and hearts, by Naglee & Deklyne, for neatness of manufacture, *A Second Premium.*

XXXIX.—*Agricultural Implements.*

The judges report a much smaller number than at any preceding Exhibition.

They make the following awards.

No. 1525. A grain fan, made and deposited by John Bamborough, Lancaster City. *A First Premium.*

No. 1524. A corn sheller, separater, and cleaner, made and deposited by A. H. Stevens, Geneva, N. Y. *A First Premium.*

No. 1601. Stalk cutter, by Samuel Ware, Kensington, Philadelphia. *A Third Premium.*

No. 1719. Fitzgerald's patent portable mill, by C. Ross, New York, deposited by Chas. Greene. *A Third Premium.*

They notice favorably,

Various agricultural implements, deposited by Messrs. Prouty & Chandler, and Lewis & Johnson's patent atmospheric churn, deposited by Messrs. B. R. Springstien & Co.

Address delivered at the close of the Eighteenth Exhibition of American Manufactures, held by the Franklin Institute of the State of Pennsylvania, for the Promotion of the Mechanic Arts, October, 1848. By the Hon. Joseph R. Ingersoll, Esq.

No department of useful improvement can be expected to prosper without public encouragement. The tardy progress of unassisted individual industry and skill, however well directed and unwearied, can with difficulty withstand surrounding rivalship, even when it has been fortunate enough to force itself into neighbouring notice and to excite limited and occasional reward. Of all the branches of mechanic art, there is scarcely one, some of whose developments have not sprung from comparative obscurity. Practical workings among elemental matter, by hands that do the humblest offices of preparation, suggest facilities which could scarcely occur to the theorist, however intelligent. The eye beholding a finished performance, well adjusted in all its parts, sees nothing of the painful and prolonged exertions, the minute and almost insensible degrees by which the result has been attained. Yet these are rich sources of combination and analysis, and combination and analysis are the only additions which genius and experience can contribute to the voluntary and liberal productions which are scattered abroad by nature with a generous hand.

Pecuniary returns are necessary objects of mechanical pursuit. But they are not the only or the principal inducements to honest industry. In its cherished prospect shines the clear light of Fame; and many an obscure intellect is brightened into glorious capacity by reflections from the enduring names of Watt and Arkwright and Fulton, once humble as its own, but now belonging to the acknowledged benefactors of mankind. Associations such as this can alone furnish opportunities for early distinction. They combine intelligence, experience, scientific knowledge, practical skill, and (haply) wealth. They draw forth from obscurity native merit and bring it into comparison with merit of its kind. If it bear the touchstone and prove of current worth, they cheer it on to redoubled energy, and leave it only when, secure in the possession of inherent and acquired strength, it can defy the bickerings of disappointed envy, and triumph in approved success.

These are in a word the objects of an Institution which in asking attention to every thing around us, performs a leading duty of its organization, and invites by a direct appeal to the senses, assistance from a well judging community. This is its proud display, its accomplishment —which yearly crowns a long career of modest and retiring efforts. Meetings monthly held with access to two thousand members, for mutual improvement; a library of gradual but certain growth; cabinets of objects for instruction; lectures connected with the Mechanic arts, natural Philosophy, and Chemistry, open not only to immediate members, but to alumni of distinguished seminaries, the University of Pennsylvania and the High School of Philadelphia; and a monthly journal replete

with varied matter to instruct and guide, now attaining its 275th number; these are preliminaries to an annual exhibition, the Eighteenth being now before us in all its admirable arrangement and teeming usefulness.

The Franklin Institute, if not the earliest association for the popular diffusion of science in its application to Mechanism, was the first to establish these periodical exhibitions of American Manufactures. An example so full of advantages to the mechanical community, has long been followed in the populous and older cities of the Atlantic border. It has now spread far into the interior. The city of Chicago, numbering twenty thousand inhabitants, after an existence as a town of some sixteen years, is about to make its second effort of a similar character. Were the practice which is so well established possessed of no other claims to merit, it would serve to collect and record from year to year authentic proofs of the progress of improvement. Of our own it may be said, that each succeeding effort, in some respects, outruns its predecessor; and each new increase in novelty and advancement, is greater, in comparison than the last. The practice serves, besides, to invite public attention; to stir up languid interest; to show what is possible by producing what is done; to stimulate exertion; to reward enterprise and industry; to prevent error; to fix a just estimate on the manifold productions of mechanic skill and bring it into notice; and to unfold the principles and the power of labor.

In the present display, there is distinguished merit. Particular excellences have been officially announced and will be duly appreciated. On an occasion when much is presented in individual branches for applause, a casual observer might be struck with the absence of others in which our manufacturers are known to excel. It is matter not less worthy of remark, that these spacious halls would readily accommodate far more numerous specimens of skill than are now contributed. A temporary building, erected for a similar exhibition in Paris in the *Champs Elysées*, has received the offerings of more than four thousand manufacturers. Perhaps patriotic artizans among us are disposed to impute to the public a lack of interest in the labors of the Institute. If a small proportion of the spirit which distinguishes any one of those sources which have been enumerated of its vital existence, those ingredients of a consistent and harmonious union, were manifested on each returning anniversary by a general indulgence of laudable and pleasing curiosity, the regret lately expressed by a distinguished foreigner, now happily identified with the science of the country, might soon cease to have support. He was surprised to find the total want of extensive Museums amongst us: those mute but expressive and eloquent teachers of otherwise inscrutable lessons of philosophy. Let public liberality contribute what would supply this valuable addition to the machinery wielded for public good by the Franklin Institute, and infinite zest will be infused into the ardor with which its immediate laborers are already animated.

There is no species of talent, no form of available and meritorious exertion, that is not at some stage of advancement, confirmed in its hopes and strengthened in its assurance by the favor of an enlightened public. Of all descriptions of merit, none more clearly exhibits or more honestly

deserves whatever encouragement it can receive, than that which is founded in mechanic skill. Its exercises and illustrations are altogether so practical, that there is scarcely room for deception in theory. The use and application are so general, and so familiar to every one, that it is almost impossible that any one should be misled by what in other branches of employment would be called empiricism or quackery. If error chance to find its way into a single quarter, truth with its disinfecting properties is distributed among a thousand and a thousand hands. Whatever sagacity may lie at the root of mechanic skill, how patient soever may have been the exertions by which it has arrived at excellence, it is for the most part applied to the ordinary purposes of life, is transparent in its exercise, and places infallible tests of failure or success within the reach of the commonest observation. When philosophy shall have done all it can for mechanism, it will find itself repaid by the moral lesson taught in return by mechanism, that power acting directly and without circumvention will produce the greatest effect. Different reasons concur in giving truth and importance to these suggestions among ourselves. No separate class exists among us aloof from the necessities of some description of toil, and from direct personal acquaintance with the fruits of industry. It has been the pride too of our countrymen to give practical efficacy not only to their own inventions, but to those of foreign birth, which coming into sickly and abortive life elsewhere, have remained for the want of a keener perception and more practical adroitness, objects of unprofitable labor or curious speculation, until both of the requisite deficiencies have been supplied. Possibly a more minute subdivision of labor, which has its unquestioned advantages abroad, may contribute to this result. Of the fact itself, one or two well known instances will suffice for proof. Our people are in the habit of turning their hands to any thing. Pioneers of the forest, the same axe wielded by the same arm fells the first tree, fashions the log into a wooden wall, cuts the tree into a boat, shapes the bean pole, and battles with the savage. Steam engines were long usefully employed for certain purposes in England. Captain Thomas Savery building upon still earlier discoveries, and especially those of Brancas, a modern Roman philosopher, obtained a patent for his invention in 1698, and it was applied to pumping water out of the Cornish mines and raising from them the ore. Newcomen improved the machinery in 1705; and Beighton simplified its movements in 1717. There it stood for half a century, when James Watt, a Scotchman, added great improvements, and it was brought, as is known to every body, into extensive use in mining, as well as for working in mechanical and manufacturing utility. But the effectual application of it to navigation was reserved for a Lancaster county mechanic. We have seen too the progress of the Magnetic Telegraph. Not its progress through space, for that defies the optics of thought itself, outstrips in rapidity the chariot of the sun, reaches a western destination while the hand of the dial goes backward without a miracle, performs its gigantic journeys according to every known means of computation in less than no time, and now, mainly by the experiments of one of the most accomplished associates of the Franklin

Institute, ascertains the longitude with almost unerring percision. By its wonderful influence, results of the recent election from various places, all of them hundreds of miles distant, were known in Philadelphia at an earlier moment than similar intelligence from the polls in the heart of the city. The progress of the discovery as a practical thing is the circumstance most worthy of notice. One of the Journals of the day quotes from Arthur Young's travels in France from 1787 to 1789 the description of "a remarkable discovery in electricity by M. Lomond." Wires connecting two cylindrical cases and electrometers, in apartments distant from each other, communicated signs or corresponding motions of a pith ball, from which the words were written down which they indicated; thus showing an alphabet of motions. The length of wires, it is added, makes no difference in the effect: "a correspondence might be carried on, at any distance; within or without a besieged town for instance; or for a purpose much more worthy and a thousand times more harmless between two towns prohibited or prevented from any better connexion." More than sixty years have elapsed since this imperfect instrument was made and thus described. But yesterday, its development has become the wonder of the world. What proportion of its adaptation to useful purposes belongs to ourselves especially, it is not necessary to ascertain. Much perhaps may be claimed by different intellects. European intelligence certainly laid a broad basis in the science of electro magnetism nearly thirty years ago, and in the subsequent discovery of the electro magnet. The use of an attractive power to write in legible characters is asserted to be an invention of our own. What will scepticism say in palliation of a doubt of the omnipresence of Deity when it finds that mortal enginery can vibrate responsive thought no matter how remote with a delay from its conception only sufficient to give it utterance? Distance increased in Arithmetical proportion is more than counteracted by additions to the series of galvanic pairs of plates which augment the magnetic power in geometric ratio.

The two inventions—the development of latent heat, which produced the steam engine, the modern lever of mechanical power, and especially of navigation by water and transportation by land,—and the development of galvanism, which produced the magnetic telegraph—seem to have been designed mainly for our country. A population spread over an immense extent, and migratory in habit and tendency, is enabled to hold immediate intercourse in one shape from the remotest distances, and personally to visit and become familiarly acquainted through the length and breadth of the land without loss of time, material expense or fatigue. The downward currents of impetuous rivers, that have no retiring ebb for thousands of miles, are stemmed and ascended with a certainty and speed, not to be commanded by other agencies, even on the surface of unresisting waters. A key to the great West, unlocks its mineral and agricultural stores, which in the absence of it, had remained for most purposes impenetrable mysteries. A new world expands in wealth and wisdom, over regions newly redeemed from the hunter and his game, and shares with more advanced civilization in distant regions, its own exhaustless and invaluable resources. In other countries, the

propelling power of steam is indeed of value, scarcely to be estimated,—here, it is indispensable. Every spot in the fertile valleys of the West, beckons its approach. Varieties of climate and soil are no longer the peculiarities of remote positions, but are brought together for the common good, as productions of the same parallels of latitude. Majestic distances are annihilated, or serve only to encourage moral elevation, without dividing local interests or preventing social and political harmony. Every additional step in the march of improvement, serves to render more obvious these peculiar advantages. The city of Chicago, at the extremity of Lake Michigan, is reached by the usual lake route from this place, in a journey of 1567 miles in six days. Works now in progress, the "Pennsylvania railroad," and the "Ohio and Pennsylvania railroad," will reduce the distance to 860 miles, or nearly one half, and will strike out more than half the time.

Other illustrations will be found scarcely less remarkable than those which have been adverted to. The tardy process of diffusing knowledge by copying manuscripts, was superseded centuries ago by the art of printing, which even in its imperfect state, was not inferior in importance to any discovery ever made. A press now in regular service at Leonardstown, Maryland, has been it seems in almost constant use for more than a hundred years. What resemblance in performance do these antiquated efforts bear to that rotary form of printing press, which is declared "to have produced on a trial experiment, twenty thousand copies per hour?" Anodynes have been used, at least from the days of Paracelsus, and probably as long as medicine has been a science. If relief from bodily suffering be the great secret of the healing art, how can mankind sufficiently appreciate for surgical and other purposes, the modern discovery of the inhalation of ether? We are told that it has circulated through the civilized world with greater rapidity than any other improvement of the day. (Patent office report.) And thus far we are assured upon the same authority, "the entire merit of originality and priority belongs to our countrymen"

An increasing desire to improve upon what we already enjoy—immediate and visible marks of the influences of improvement on an extensive theatre—and above all, substantial benefits derived from the practical character of our improvements—these are among the causes which will make our country the home of the mechanic arts. The realms to be occupied, and the work to be performed are disproportioned to the numbers who are to subdue the one, and to execute the other, according to ordinary rules of political economy. You overcome the difficulty by making a single machine perform the labor of five hundred hands. Undertakings, however great, cease to be formidable when your means are as gigantic as your object: boldly to attempt, seems alone necessary triumphantly to overcome. Adaptations in many respects belonging to ourselves, are in unison with inherent principles of art. Mechanism is the joint offspring of science and simple labor. We are proud enough to aim at the one, and not too proud to stoop to the other. Mighty efforts of genius have been employed in suggesting the elements, and determining the rules which must govern its operation,

while the mere docile hand of willing industry can put into practice the operations which are the fruits of them.

Having traced the commonest instruments of mechanic industry, from the uneducated, whose hands have given the last touch to the suggestions of brighter or more accomplished intelligences, back to those intelligences themselves, we shall have made but a portion of our journey in pursuit of truth. Beyond the proudest human intellects will be found a wiser and a holier teacher. Nature, the immediate offspring of the Parent of all good, instructs and teaches *them*. When a seaman finding a bale of goods too heavy for his strength, calls in the help of his familiar tackle, and then raises it with ease, he avails himself unconsciously of the philosophy of Vitruvius, who merely solved the problem of the agency of one of the half a dozen fundamental mechanical powers, which nature had under a different name, placed in his hands. She is the prolific source of all inventions. Reject her precepts, and genius and industry labor in vain. The quadrature of the circle, and the philosopher's stone, will probably be discovered only with the elixir of life: because they are all at variance with her essential laws; and perpetual motion must reconcile impossibilities, and reverse decrees as settled as the foundations of the earth, or it will remain an ignorant and abortive dream. Nature is as kind in her broad hints against working in the dark, as in pointing out true paths. Perhaps the pursuit of ingenuity, for example, in improving pneumatic engines, or those in which air is the agent of motion, might be diverted into more profitable channels, by the certainty that heat applied to the expansion of any gas, furnishes but a minimum of the power to be derived from similar applications to water or other liquids.

We talk of the pride of science. But science manifests wisdom and foreshadows success, when it assumes its humblest attitudes. To learn that we are unlearned, to see and appreciate the great extent of power that surrounds us, to feel how much of it is unattainable, and in humble hope to try to reach the lowest limits of its lofty sphere, and make a little segment of it our own, are genuine marks of merit, and just aspirings of devout ambition. Science is nothing more nor less than a knowledge of the works of nature, and the mode of making some of them available to purposes of human life. A development of her seeming mysteries is the utmost aim and end of scientific investigations the most profound. Philosophy in its abstruse and successful labors, can at last only hope to become acquainted with, and set in motion, the operation of her simple laws. The earliest and the latest lesson in the ample book of science, is inscribed by the finger of Nature. Her merest elements are full of wisdom: her sublimest efforts are not without simplicity. The inspiration of the brightest intellects, has been traced to what may be regarded as some of the most humble of her agencies. If a swallow's nest taught, according to the ancient architect, the art of thatching roofs with sprigs and loam; if a stagnant pool furnished philosophy with the element of artificial light; if the wet string of a kite unfolded the phenomena of electricity; and if fruit falling from the tree demonstrated the agency which keeps in place and motion the universe,—what undiscovered

secret may not yet reward a watchful scrutiny of Nature's familiar works? If minds partaking so largely of celestial mould were *thus* inspired, more limited intelligences may be content to bow their heads, and derive instruction from the same unerring source. Words wiser than the examples of philosophy refer us, if we would be also wise, to the lowly example of the humblest creeping thing, that having "no guide, governor or ruler," "prepareth her meat in the summer, and gathereth her food in harvest." Yet wisdom when even thus humbly taught, as we learn from the same inspired teacher, is "more precious than pearls: all things that thou canst desire are not to be compared to it,"—for "by wisdom is laid the foundation of the earth."

The pride of philosophy must be contented to stoop still lower. Nature herself, pure and uncontaminated, is in the eye of reason, always exalted even in her humility. Her immediate instinctive agencies, deriving wisdom unmixed from its divine fountain, are only one degree less exalted than herself, in their vicarious character. Other sources of instruction must be sought, which having neither the originality of inanimate objects, nor the promptings of unsophisticated instinct, happen to enjoy opportunities and experience, better than those of the philosopher in his schools. The ways of plodding industry in its humblest employments, must occasionally be trodden by those who are at home on the summit of the hill of science. The hand must be able and accustomed to perform some of the menial offices of philosophy, that its minutest details may be understood, and that examples may be set which none may fear to imitate. It was a wise rule of Turkish despotism, that the sovereign should spend a portion of every day in some mechanical employment. Mahomet IV. was deposed because he refused to conform to this salutary rule. We learn from authority so good as that of Sir George Staunton, that the Emperor of China once every year directed the plough through a piece of ground, dressed as a husbandman, to reconcile the farmer to his occupation. Charlemagne ordered that his children should be instructed in some profession. The Emperor Augustus is said to have worn no clothes but such as were made by the empress or her daughters: and Olympia, the mother of Alexander the Great, performed the same office for her warlike son. Is it a fanciful suggestion of the author of a book of much interest, which traces the dignity of mechanical employments beyond the flood? He insists that Adam was a gardener, Abel a shepherd, Seth a weaver, Enoch a tailor, and Noah, (undoubtedly!) a shipwright. There may be situations in the life of any man, when the might of learning may become of little comparative use, and when the hand being turned to its primitive employments, becomes the master instead of, and in preference to, the head. Who does not admire among the brilliant accomplishments of some of his charming female friends, their skill and frequent exercise in the use of the needle; a purely mechanical employment, and which of those charming friends is without a greater or less degree of excellence, in a faculty which she shares with the humblest of her domestics?

Our researches will sometimes discover a high degree of mechanical taste and aptitude for performance in unexpected quarters. It would

scarcely occur to those who are familiar with the productions of exquisite and luxurious refinement in manual art, to seek for instructors in the heart of Southern America, and there among the children of primitive simplicity. Yet they would not look for it among them in vain. The Indians of Peru, occupying the Sierra, which includes the valleys between the Cordilleras and the Andes—the Serranos as they are called—are said, by the latest travelers, to have attained a high degree of perfection in handicraft employments. As goldsmiths, according to the work of Von Tschudi, they are remarkably skilful, and in this branch of industry they produce work, which, for taste and exquisite finish, cannot be excelled in the capitals of Europe. Various kinds of vessels and figures of silver wire—filigranos is the name they bear—made by the Cholos in Ayacucho, have always been favorite articles of ornament in Spain. The Indians of Jauja are very skilful in working iron. Of leather also, they make various things in beautiful style. A circumstance, not inappropriate here, is quoted by the learned biographer of Nathaniel Bowditch, (whose father, it may be remarked, was a ship master turned into a cooper,) from Baron Zach's "*Correspondance Astronomique.*" The Baron, with all the world, went to visit Mr. Crowninshield's splendid packet, the "Cleopatra's Barge," on her arrival at Genoa, in 1817. On learning from the Captain's son, a pupil of Bowditch, how little was the error, in their reckoning, in making the Straits of Gibraltar, he inquired how they got their longitude so accurately. The answer was, "First by our chronometers, and afterwards by lunar distances." The Baron expressed surprise, and somewhat unkindly observed, "Do you know how to take and calculate the longitude by lunar distances?" The young navigator replied, "Why our *cook* can do that; there he is," pointing with his finger to a negro at the stern of the ship, with a white apron before him, and holding a chicken in one hand, and a butcher's knife in the other. "Come forward, Jack," said the Captain, "the gentleman is surprised that you can calculate the longitude; answer his questions." The Baron asked him what method he used to calculate the longitude by lunar distances? His answer was, "It's all one to me: I use the methods of Maskelyne, Lyons, Mitchell and Bowditch; but, upon the whole, I prefer Dunthorne's; I am more used to it, and can work with it quicker." The foreign astronomer declares that he saw all this negro's calculations of the latitude, the longitude, and the true time, which he had worked out on the passage; and that all his questions were answered by him with wonderful accuracy, not in the Latin of the Caboose, but in good set terms of navigation.

Connected, if not identified, with the principle of humbleness, which is another word for conviction that knowledge does not disdain the lowliest bed, is the principle of docility. Innate parts are obviously unequal. Whatever may be the cause, it is impossible to doubt that inequalities exist among untutored human intellects, and in the facilities of acquiring instruction. *One* may receive the electric spark of wisdom, while *another* gropes his way tediously through dark and gloomy paths in pursuit of her celestial light. But all must be content to

learn. Inspiration, in its literal sense, belongs to none. With this quality in the learner, a desire to know, and willingness to be taught, it is not too much to say, that a due degree of valuable acquisition may with certainty be made. Nature not only opens her store-house of instruction to universal use, and places the key in the hand of every one who earnestly desires to possess it, but she facilitates the accomplishment of her generous purposes, by applying her suggestions to use, and sustaining them with resources adapted to local wants and capacities. Who can doubt the destiny of our own commonwealth and the duty of her sons? Her stones are iron. Her soil teems with subterranean fuel, bursting the solid entrails of the earth, along with the strongest, hardest, most abundant, and most useful of metals, and rendering it as malleable and far more valuable than the Ophir gold. Together they are the great means of manufacturing industry. They utter from the ground a voice, which nothing but wilful error can misinterpret, more prophetic and persuasive than an oracle. Let the rich jewel sparkle in the royal diadem that loads the brow of the monarch of its native soil. We will neither envy its possessor, nor desire to exchange for it our less brilliant productions. A single diamond found in Brazil, estimated at £224,000 sterling, graced the crown of Portugal. More than three hundred and seventy diamonds are said to belong to the British crown, supposed altogether to be worth £111,600. One ton of iron, wrought into the mechanic uses, which many a specimen about us modestly exhibits, has, in our eyes, a worth, intrinsic and extrinsic too, which surpasses that of all the diamonds ever mined. It makes both spears and pruning hooks; is the material alike of the sword and the ploughshare. Its moral uses are still more exalted. It cultivates a spirit of honest industry, rewards the hard hand of labor, stimulates ingenuity, promotes national independence, advances the progress of useful knowledge, gives comfort and convenience to society, and zest and safety to the enjoyments of life, and above all, stamps the character of the age as one of solid substantial merit, above and beyond all that former times, in their wildest fancies, hoped for or conceived. What strange perverseness seized the ancient poets when they placed the iron age last and lowest in the catalogue of time! Silver and gold are in truth the inferior metals to every useful purpose. One of the best of the ancient classics doubted whether the gods might not have denied them in mercy to mankind. Iron is the metal of sound philosophy, universal science, and advanced civilization. Apollo never would have given Midas asses' ears if he had wished by his touch to turn every thing into iron instead of gold. The primitive inhabitants of Brazil used fish-hooks of gold, merely because they thought they could do no better: and they abandoned the practice when they found that the right material abounded in their soil.

Of all the varieties of the Carbon family (to which the diamond belongs,) the diamond is intrinsically the least useful. It derives its charm only from its scarcity. It will not even burn, but with great persuasion, while its brethren of the coal tribe perform their duties with alacrity. The little piece of plumbago at the end of a scarcely larger

piece of stick which form together an ordinary lead pencil, is a twin brother of the diamond. In describing a scientific memorandum or friendly suggestion, it performs an office quite as interesting as that of its more admired relative. We sometimes hear, in praise of the writings of authors of genius, that they are as brilliant as if they were written with a diamond. As it was said of the words of Rousseau, that they were so warm as to burn the very paper on which he wrote. The pencil in daily use, the point of which is scandalized by the universal name of black lead, has nothing of lead about it, but is in reality the same generic substance as the gem of royalty. Half a dozen philosophers, we are told, can make the world believe any thing: and unhappily when they have once created error, it is not without time and effort that it can be dispelled.

Preferring our own productions to what the world is pleased to call the precious metals, and precious stones, let us derive consolation from what we have. Coal is the agent of mechanism, iron the material on which it operates, and steam the power by which its effects are produced.

One is struck with the application of some of these endowments to purposes for which at a former period they scarcely seemed designed. In constructing boats to float upon the water, lightness of the material was deemed a necessary ingredient. Specific gravity is proved to be no longer worthy of consideration if buoyancy be attained. Ponderous substances are as capable of performing the other offices of timber and at the same time of withstanding perils by which vessels of timber would be speedily destroyed. When a small detachment under the auspices of the navy department recently visited the Dead Sea and sounded those asphaltine depths which continue to involve the impenetrable mysteries of the guilty cities of the plain, they carried with them from the shores of the Mediterranean two metal boats, one of copper, which was mistaken by the natives for gold, and one of iron; and they purchased the only wooden one that was to be found on the sea of Galilee. In descending something like a thousand feet of cataract along the almost sanctified waters of the Jordan, their timber bark was shattered. Those of metal defied and triumphed over opposing precipices, and proudly bore the banner of their country on and through the dangers of the river, until it floated in melancholy grandeur on the surface of that sea, whose doomed waters sustain no life within their bosom. Thence the little boats were conveyed in safety back to the government ship to which they belonged, not materially injured by the hardships they had undergone.

A becoming modesty has been commended to the votaries of science of every class; but abatement is not therefore needed of proper self-respect. The two properties are compatible and of mutual advantage. Modesty is the crown of merit, and merit is in most instances the fruit of modesty. A sense of present deficiency prompts to exertion in order that it may be supplied, while toilsome acquisition satisfies us how much we owe to labor, and how humble would be our pretensions stripped of what we have acquired. Cultivated merit can scarcely fail to aspire to

distinction, which is its incentive to exertion. Nature in prompting to honorable efforts and placing within reach the means of improvement and assurances of accomplishment, exacts in turn a faithful, steady and zealous performance of every thing that is necessary to develop her resources, and thus to manifest our gratitude and to deserve success. In far better language than our own,

> "Spirits are not finely touched,
> But to fine issues; nor nature never lends
> The smallest scruple of her excellence,
> But like a thrifty goddess, she determines
> Herself, the glory of a creditor,
> Both thanks and use."

Yet another faculty of fitness to surrounding objects is requisite, in order to give full effect to improvement. It was not enough that whole empires should be penetrated by navigable waters, and that means should be at hand to ascend their impetuous floods. It was not enough that metallic ores should abound, coupled with mineral agencies to give them shape. All the riches of a luxuriant soil would rest in unprofitable inactivity, and all the means for diffusing them in transformed and practicable existence over a smiling land, would stagnate in repose, if *men*, with suitable tempers and tendencies, did not present themselves, to fashion and apply them. The faculty of matter is nothing without the faculty of mind. Willing hands must dig up the shapeless ore, and ingenious and active minds must metamorphose it into the material of mechanism, and then mould it into its thousand instruments, and with those instruments create the thousand fabrics for the perpetually increasing demands of civilized life. The works of nature expand and multiply with the wants of society and the ingenuity of mankind. Look around you, and behold them in almost infinite variety of elegance and character and use.—Say, if you can, which of them all in its present state of beauty and apparent and approaching perfection, does not owe its finished condition to the pure elements bestowed by Providence, either as ingredients and component parts, or as necessary tools and instruments in accomplishing the results,—combined with human skill and industry. This is the whole secret of mechanic art. Nothing is available without a combination, which indicates that the two things were made for each other, and that each must be kept in vigorous and active exercise together.

Fortunately enterprise is the distinguishing property of our countrymen. The indulgence of it is as diversified as the faculties or the desires of men. Some pursue the game of the great deep, and bring home from the bosom of distant seas their hard earned spoils. Others seek the forest, and delight to act the pioneers to civilization among the perils of Indian warfare and uncultivated wilds. Many hold the plough, and enjoy the luxuries of agriculture. Not a few chain their adventurous spirits to the anvil, the lathe, the crucible, the furnace and the loom, and breathe an atmosphere of labor, surrounded by almost untasted refinements that are supposed to belong especially to city life. But all are active, and numbers are keenly alive to the resources within their reach. More anxious and active spirits probably breathe here

than in any other part of the world. Restless and almost countless numbers vie with each other in struggles for distinction in some new discovery or untried exploit. A disposition so marked as belonging to ourselves, would seem to be derived from the adventurous character of that bold mariner who dared to explore distant seas, and brought European experience and civilization to these unknown shores. The destiny of nations has often been stamped by the tendencies of their founders. Rome did not more completely justify her warlike inheritance in her long annals of conquest and renown than these republics their ancestry in Columbus in the daring pursuit of new discoveries which distinguish their sons. They never tire in emulating by infinitely diversified efforts that exploring spirit which spurned the trodden paths of geographic knowledge, and firmly resolved to find in an unknown and almost unimagined world the foundation of empires, the latest, if not the brightest, in that bright circle of civilization which has been expanding ever since time began.

To meet the enterprising tendencies of our people, provision is made by fundamental law for promoting the progress of science and useful arts, by securing to the ingenious for limited times the fruits of their ingenuity. The genius of our institutions does not stop there in its encouragement. It facilitates the acquisition as carefully as it provides for the existence of this stimulating security. No where are the temptations to originality so abundant or so freely brought home to the enterprising as among ourselves, whether the exuberance of encouragement be for good or evil. Legislation anxiously directed to the object is at once co-extensive with the Union, and every where uniform in its invitations through all the sovereignties of the wide spread confederacy. The judicial tribunals of the country, actuated by a corresponding sentiment, and faithfully disposed to carry out the benevolent designs expressed in the constitution and the laws, have always given the most liberal interpretation to the language of both, in favor of the inventor. All things concur in happy contribution to the mass of inducement which has not failed to produce competition which is unequaled elsewhere. It would not be fanciful to believe that this combination of natural advantages and the constitution and laws with judicial concurrence and strong public sentiment; in other words that patents and the general support of them, are among the most valuable promoters of national advancement. Some nations are stationary and have undergone little or no change in their condition for centuries. Others have degenerated and fallen lower and lower in civilization. Patents by quickening the latent energies of these stubborn races would have served to prevent their degradation if the people could have profited by the encouragement which they afford. Without such provisions we are in no similar danger. With them, under proper regulations the career of improvement is likely to be as rapid, as the subjects of improvement and protection are numerous.

A patent is obtained where it is deemed due at the smallest possible expense. If the claims to originality appear on examination to be doubtful or ill founded, the applicant is at liberty to withdraw his application, and two thirds of the very moderate fee which he has paid are

returned to him. Every opportunity is afforded for impartial scrutiny. If at last an official ordeal be passed and the inventor is fortified with the seal of government, no barrier is interposed by it to individual contest, and, it may be, to eventual overthrow. The pretensions of a holder of a formal patent are still open to free objection and defeat. A concealment of the truth as to the alleged discovery, or complicating a description with unnecessary and superfluous matter with a view to deceive, or want of originality and priority, even in actual discovery or invention; or description of it anterior to the supposed discovery of the patentee in some public work; or a prior public use or sale of it; or surreptitious or unjust practice in obtaining a patent, for that which in fact belongs to another; fair and timely notice being given of any of these allegations, will avoid the grant and cause the patent thus unworthily held, to be cancelled. While serious injury is prevented to the public by monopolies, and to individuals by interference with a lawful use of what should be open to every one; while precaution anticipates, and subsequent opportunity is afforded for correction and redress of inadvertent error; the number of patents applied for and actually obtained is large. This is to be imputed rather to the character of the people than to any undue facilities in obtaining them which are less than might at first be supposed. 1531 applications were made in the year 1847. 572 patents were issued during that period including those standing over from the previous year. Among them there is of course infinite diversity. They vary in every degree of modification from "twine stands for counters" to "cannons," from "fish hooks" to "improved steam engines." No end seems to be yet in view to the attempted perfection of these last invaluable machines. Whistles, and valves, chests, pipes, pistons and stop cocks, are thrown up by the fires of invention like pieces of matter from the entrails of a volcano. Yet fatal accidents alarm us daily in spite of hundreds of positive preventives and assured reliefs. The frequency of application and grant may be understood from the fact, that although the expenses of the office are not small and the fees charged to applicants are so inconsiderable, a surplus of fund derived from these causes amounted, on the 1st of January, 1848, to $207,797·98.

The application of these remarks will be seen when it is understood that the Commissioner of Patents, in his last interesting report made to Congress, considers his office "as the head and representative of the inventive genius and the industrial arts of the country." Without any desire to question the justice of this claim, it may be maintained that the Institution which has brought together all these specimens of home manufactures is an efficient coadjutor. It cherishes true merit and affords early, ample and favorable opportunity for display, comparison, encouragement and correction. Having taught the elements of science, chemistry and the various departments of experimental philosophy, every thing that in the sphere necessarily allotted to it can elevate and embellish mechanic skill, it kindly interposes to restrain the exuberance of inventive genius by awakening at once keen perception and wary distrust; and it endeavors to guard against painful disappointment, as well as to foster prudent hope.

These creditable and well sustained efforts are directed immediately to the improvement of individuals who have already entered on a career of labor; individuals, young indeed, but with habits in some degree formed by a sort of education or the want of it earlier in date than the influences of the Franklin Institute. Aptitudes even with them, may be imperfect or totally wanting, in consequence of the absence of suitable preparation at a still more flexible period of youth or boyhood. Might not the like influence be carried farther back than the age of apprenticeship to which they now extend? Taste is a faculty of early growth. It is a faculty not only susceptible of high cultivation, but one that without cultivation has scarcely any available existence. It is acquired by opportunity and observation rather than actual study; from models made familiar in constant intercourse rather than formal rules. Yet, when acquired, it is infused into all the exercises of mechanic industry. External proportion, symmetry and grace, can become ingredients of useful objects, as well as the sterner properties of strength and durability. To a certain degree the effect is produced already. But it may be carried still farther, and scholars may be found ripe for instruction at the loom, the anvil, and the workshop, with experienced masters, and in the lecture room and the conversation hall, with brother manufacturers and learned professors, with nothing to unlearn. The benevolence of Mr. Girard might, in aid of his clearly expressed wishes and without any change in its arrangements, furnish a nursery for this plan. The pupils of his magnificent charity will naturally be calculated for mechanical employments. It would spoil them to distort them into professional men. With an eye directed to their subsequent career, from the very beginning of their almost infant course, all the discipline they receive, might well adapt itself to the character of instruction and employment, which this institution endeavors to promote. Under judicious preparatory pupilage, the young mechanic having passed through his initiate stage, would come to his labors with double aptitude. He would be trained to master the difficulties of honorable employment, and to elevate its standard by suitable embellishment. Things useful acquire new attraction when they become beautiful. With the ancients, utility was regarded as the source of beauty. At all times, the two qualities without any interference may be profitably combined.

It is presumption in one so little skilled, to bespeak occupations or to foretel developments for those whose benevolence has made them active, and whose experience has made them wise. The merits of the Franklin Institute are written in the history of its transactions. No pledges of usefulness in the future are needed beyond those of past performance. In the vast laboratory of Nature, ingredients are deposited for the uses of yet unborn philosophy. Time, which is the great unraveller of mysteries, will at the proper moment make them known. Ages will not exhaust them. Let us hope, that when this generation shall have closed its valuable labors, successors supplied with ample materials, may be found to emulate its zeal and fidelity.

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